GROUNDWATER MONITORING SYSTEM REPORT
PROJECT 8520

For

New Jersey Zinc East Plant, Palmerton

By

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February 1987

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GROUNDWATER MONITORING SYSTEM REPORT
NEW JERSEY ZINC EAST PLANT, PALMERTON

INTRODUCTION

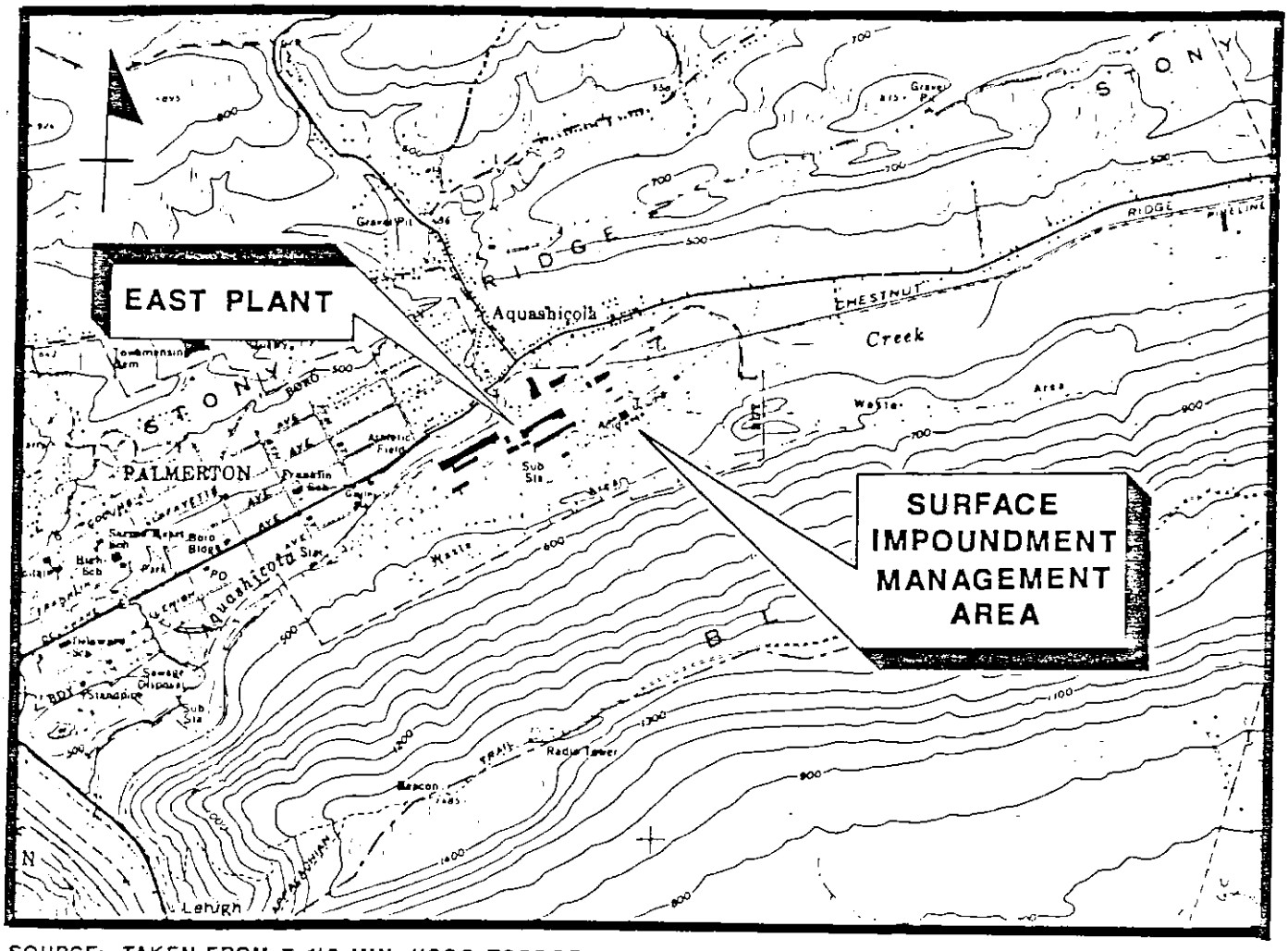
This groundwater monitoring system report summarizes all aspects of the existing groundwater monitoring system for the wastewater treatment facilities at New Jersey Zinc's (NJZ) East Plant in Palmerton, Pennsylvania. It explains the reasons for the system's existence, site hydrogeology, monitoring well specifications, and sampling and analytical protocol.

Even though NJZ has discontinued use of its surface impoundments, the company has been required by the Pennsylvania Department of Environmental Resources (DER) and the United States Environmental Protection Agency (EPA) to install a groundwater monitoring network, in compliance with RCRA, to determine if groundwater contamination problems resulted from past use of their surface impoundments.

BACKGROUND INFORMATION

NJZ's East Plant facility is located in the south-central portion of Carbon County and borders the communities of Palmerton and Aquashicola (Figure 1). Physiographically, it is bordered by Blue Mountain to the south and west and Aquashicola Creek to the north, east, and west. The facility currently produce metallic zinc, zinc oxide, and formerly produced cadmium, ammonia, sulfuric acid, carbon dioxide, and indium.

Prior to July 1986, the wastewater treatment facilities at NJZ's East Plant consisted of two (2) large surface storage impoundments and two (2) smaller surface settling impoundments



SOURCE: TAKEN FROM 7 1/2 MIN. USGS TOPOGRAPHIC QUADRANGLE OF PALMERTON, PA.

FIGURE 1

GENERAL LOCATION MAP

0 2600'
APPROX. SCALE

(Figure 2). All four (4) impoundments have now been taken out of service and are in the process of being closed by NJZ. All water previously processed through the surface impoundments, are now routed through a series of large aboveground holding tanks located adjacent to the former impoundments.

The two (2) large triangular-shaped surface impoundments were previously used for temporary storage of wastewater and runoff from the "Acid Plant" area. Their combined capacity has been estimated by NJZ as approximately 5,680 m^3 (1.5×10^6 gallons). These impoundments could have contained quantities of cadmium, lead, and zinc. ("Evaluation of Runoff and Discharges from New Jersey Zinc Company, Palmerton, Pennsylvania," December 1979, NEIC - Denver, Colorado, Pages 78-83). Both impoundments were reportedly clay lined.

The two (2) smaller impoundments were used as settling impoundments in conjunction with the neutralization process. Overflow from the thickener in the neutralization process was discharged to these impoundments, which were operated in parallel for solids removal. Because solids could not be removed from the thickener as fast as they accumulated, the thickener was emptied into these two (2) impoundments every three (3) to four (4) days. Sludge collected in these impoundments was reportedly dredged and recycled in order to reclaim its metallic content. These impoundments contained quantities of cadmium hydroxide, lead hydroxide, zinc hydroxide, silica, lime, and calcium sulfate.

While details concerning the lining of the two (2) settling impoundments is unknown, it is assumed that any liner which may have initially been installed was probably disturbed by the continued dredging of solids.

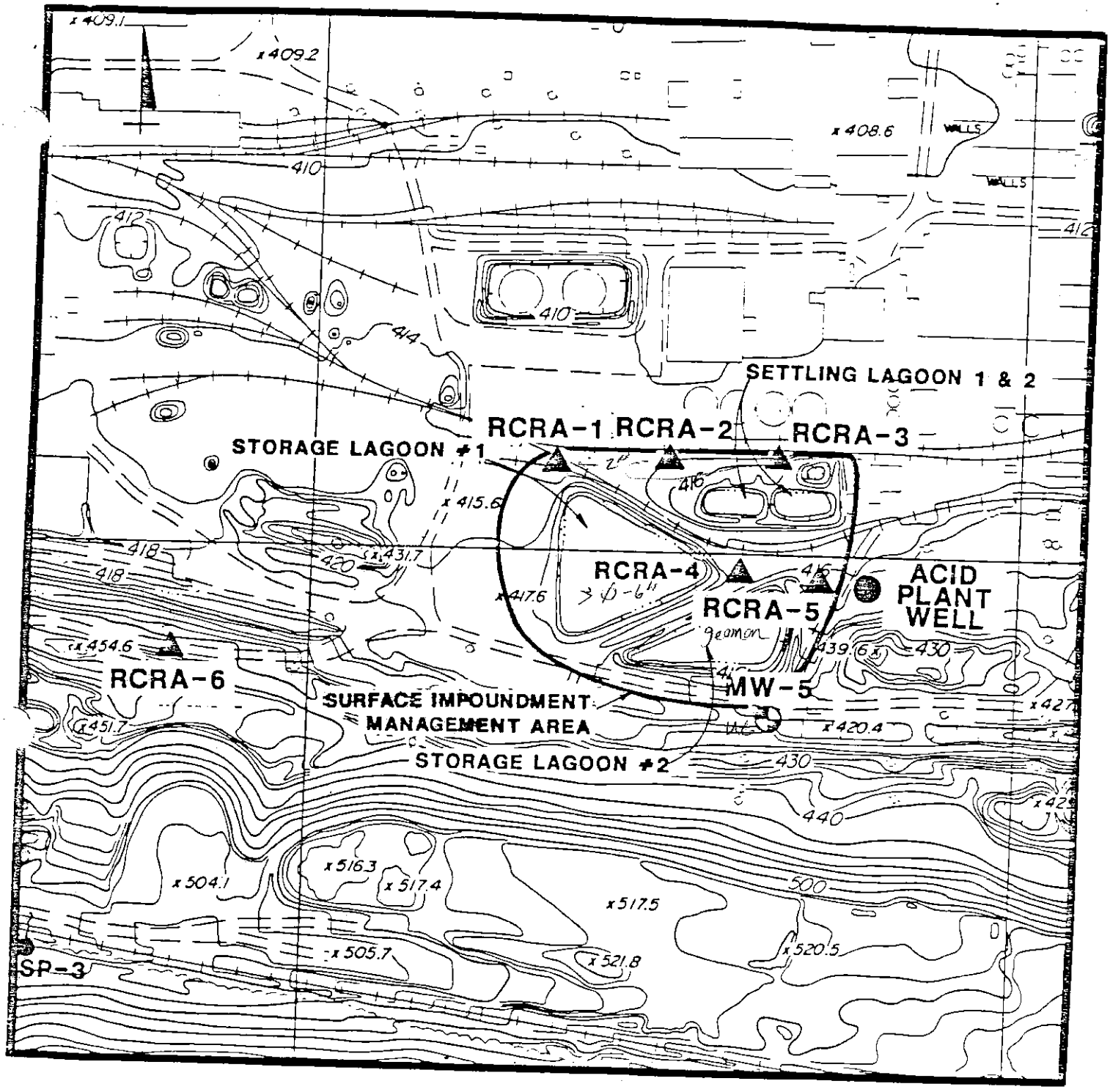


FIGURE 2

MAP SHOWING WELL LOCATIONS AND
SURFACE IMPOUNDMENT MANAGEMENT AREA

0 200'
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GROUNDWATER MONITORING SYSTEM

Section 75.265(n)(4) of the DER Rules and Regulations requires at least one (1) hydraulically upgradient and three (3) hydraulically downgradient groundwater quality monitoring wells be installed and maintained for the purpose of detecting any hazardous waste or hazardous waste constituents that might migrate from the Surface Impoundment Management Area. To date, six (6) wells have been drilled at NJZ's East Plant Surface Impoundment Management Area, for the purpose of fulfilling the above requirements and to acquire hydrogeologic information pertaining to the underlying aquifer.

Based upon a preliminary hydrogeologic assessment of the site, using available existing data, the three (3) downgradient wells designated RCRA-1, RCRA-2, and RCRA-3 (Figure 2) were drilled and constructed at locations reviewed and approved by DER and EPA Region III. These wells are assumed to be capable of immediately detecting any statistically significant amounts of hazardous waste or hazardous waste constituents that may migrate from the Surface Impoundment Management Area.

The well designated MW-5 (so designated because of its role as a monitoring point in an ongoing CERCLA Investigation) serves as the upgradient RCRA monitoring well for the Waste Management Area.

In addition to the required monitoring wells, two (2) additional wells were drilled to assist in understanding the hydrogeologic conditions at the Wastewater Management Area. The well

designated RCRA-4 was drilled to serve as a pumping well for the attainment of hydraulic information concerning the underlying glacial outwash aquifer. The well designated RCRA-5 is a GEOMON well (similar to a nested piezometer) which was drilled and constructed to help understand the vertical flow component of the glacial outwash aquifer. Three GEOMON samplers were installed at different levels in this well and physically isolated from each other, to attain head measurements at specific depths.

MONITORING WELL CONSTRUCTION

All RCRA monitoring wells were drilled using cable tool drilling methods. This method was selected as drilling conditions were expected to be difficult due to the presence of cobbles and boulders reported by previous drilling and excavation records.

Typical well construction was completed by drilling a six-inch diameter hole and driving six-inch diameter steel casing to the top of, or a few inches into, bedrock. A minimum of five (5) feet of rock was then drilled to insure that the rock encountered was bedrock and not a large glacial erratic or colluvial boulder. Upon completion of drilling, the open bedrock hole was sealed with bentonite pellets to preclude any potential for drilling induced migration of contaminants, if any, between the bedrock and unconsolidated aquifers. Following sealing of the open rock hole, a minimum two-foot layer of Morie Grade 0 silica sand was placed in the well bore to isolate the well screen from the bentonite. Next, flush joint, threaded, two-inch diameter, Schedule 40, 10-slot, Timco, PVC well screen and unslotted PVC riser pipe were installed in the well bore to serve as the finished monitoring tube for the unconsolidated aquifer. Typically, five-foot sections of screen and riser pipe

were alternated throughout the saturated thickness of the unconsolidated aquifer. Subsequent to well screen and riser pipe installation, the annular space between the monitoring well and the borehole was backfilled with Morie Grade 0 silica sand to a minimum of two (2) feet above the top of the screen. As the sand pack was added, the six-inch temporary steel casing was extracted from the hole, with manual measurements continuously taken to insure sufficient sand was placed to prevent formation collapse around the well. A bentonite pellet seal, with a minimum thickness of two (2) feet, was next installed above the sand pack and, six-inch diameter steel protector casing then set into the upper bentonite seal, with a minimum of two (2) feet extending above ground surface. Well construction was completed by placing a bentonite/portland cement grout seal above the upper bentonite seal, both outside and inside the six-inch protector casing. Each well was also equipped with a six-inch locking cap, painted a highly visible yellow, and numbered. Lithologic and well construction logs for all wells are included in Appendix I.

With the exception of two (2) wells, RCRA-4 and RCRA-5, the above well construction procedures were followed for all RCRA monitoring wells. In RCRA-4, formation samples were collected and sent to Johnson's UOP Screen Laboratory for grain size analysis so that a properly sized well screen and sand pack integrated to the geologic formation could be installed for the pumping test of the unconsolidated (upper) aquifer. All construction procedures previously described were employed, except that six-inch diameter, Schedule 40, 25-slot, Johnson, PVC well screen and Timco, PVC, riser pipe were installed in place of two-inch diameter PVC; and Morie Grade 3 silica sand was installed instead of Morie Grade 0 sand.

In RCRA-5, all drilling was consistent with that previously described, but in place of a two-inch diameter PVC monitoring well, a set of three (3) GEOMONS, were installed to monitor vertical head distributions within the unconfined aquifer. As no apparent confining layers were observed during drilling, the three (3) GEOMONS were installed at approximately equal intervals (vertically) from each other. Each GEOMON was sand packed in place and separated from the adjacent GEOMON by a minimum three (3) foot thick bentonite pellet seal.

HYDROGEOLOGIC FRAMEWORK

Site Geology

The surface impoundment area at NJZ's East Plant is underlain by a moderately thick (28 to 52 feet) sequence of unconsolidated materials consisting of artificial fill and Wisconsinan glacial outwash overlying shale and siltstone of the Bloomsburg Formation. A fence diagram of the subsurface geology, based upon results of RCRA monitoring well drilling, has been included as Plate 1.

Fill encountered, typically consisted of dark gray to black cinders, slag, and clinkers, that at some locations, was intermixed with sand and gravel from the underlying or surrounding glacial outwash, and thinned in a northward direction (away from the cinder bank). During drilling, no groundwater was encountered within the fill, and water used in the drilling process was rapidly lost to the formation.

Directly underlying the fill, at all drilling locations, Wisconsinan glacial outwash was encountered. This unit can be divided into three (3) distinct subunits based upon its gravel and cobble content, as described below.

Varying in thickness from approximately seven (7) feet at RCRA-1 and RCRA-5 to fifteen (15) feet at RCRA-3, the uppermost subunit consists of a grayish-brown to medium brown, poorly sorted, silty, sandy gravel with numerous distinct layers of cobbles and some boulders. Here, the gravel is comprised of fine to coarse, sub-round to round, shale, siltstone, sandstone, quartzite, and chert, with some minor limestone. The sand is predominantly medium to very coarse-grained and subangular to sub-round with many of the sand-sized particles being dark gray (siltstone/shale parent material) which gives the entire upper subunit its grayish-brown color. Water was encountered in this subunit by many of the RCRA monitoring wells.

The middle subunit consists of a grayish-brown to medium brown, silty, gravelly sand. While some cobbles were still encountered here, their number noticeably decreased. Traces of clay, in the form of thin, discrete, noncontinuous layers and lenses were also found, and help to differentiate between this and the upper subunit. Sorting in this middle subunit was also found to be more pronounced than that in the upper subunit.

Sand within the middle subunit is mostly medium to coarse-grained, subangular to sub-round, quartz and dark gray and reddish-brown shale and siltstone particles. Particle size tended to become finer with depth. Gravel and cobbles that are present consist of the same lithologies as those in the upper

subunit. Thickness of the middle subunit ranges from eleven (11) feet at RCRA-3 to twenty-two (22) feet at RCRA-1.

The third or lower subunit consists of a medium brown to orangish-brown, slightly clayey, silty, fine to medium-grained sand, with traces of gravel. Sand grains are sub-round to subangular and primarily quartz and dark gray to reddish-brown shale and siltstone particles, which become more prevalent with depth. Small orangish-brown clay lenses were encountered by several monitoring wells but are not believed to be continuous strata. The material in this subunit is well sorted, very dense and appears more weathered than the upper two subunits. The interfaces between the upper, middle and lower subunits are gradational, with no confining layers evident.

Unconsolidated materials (fill and outwash) in the vicinity of the surface impoundments are underlain by bedrock of the Ordovician Bloomsburg Formation, a dusky red, reddish-brown, and grayish-green shale, silty shale, siltstone, mudstone, and fine-grained sandstone. This rock unit has undergone intense deformation resulting in highly fractured strata which are overturned and dip toward the south. Depth to the bedrock surface is irregular, varying between twenty-eight (28) feet at RCRA Well 5 and fifty-two (52) feet at RCRA Well 1. Generally, depth to bedrock increases in a north to northwest direction away from Well MW-5 (Figure 3). A small northwest-southeast trending bedrock trough is believed to exist, and is evident on the Bedrock Contour Map (Figure 3); however, additional drilling or geophysical study would be required to confirm its presence. This trough, if present, could impact the groundwater flow system in the impoundment area.

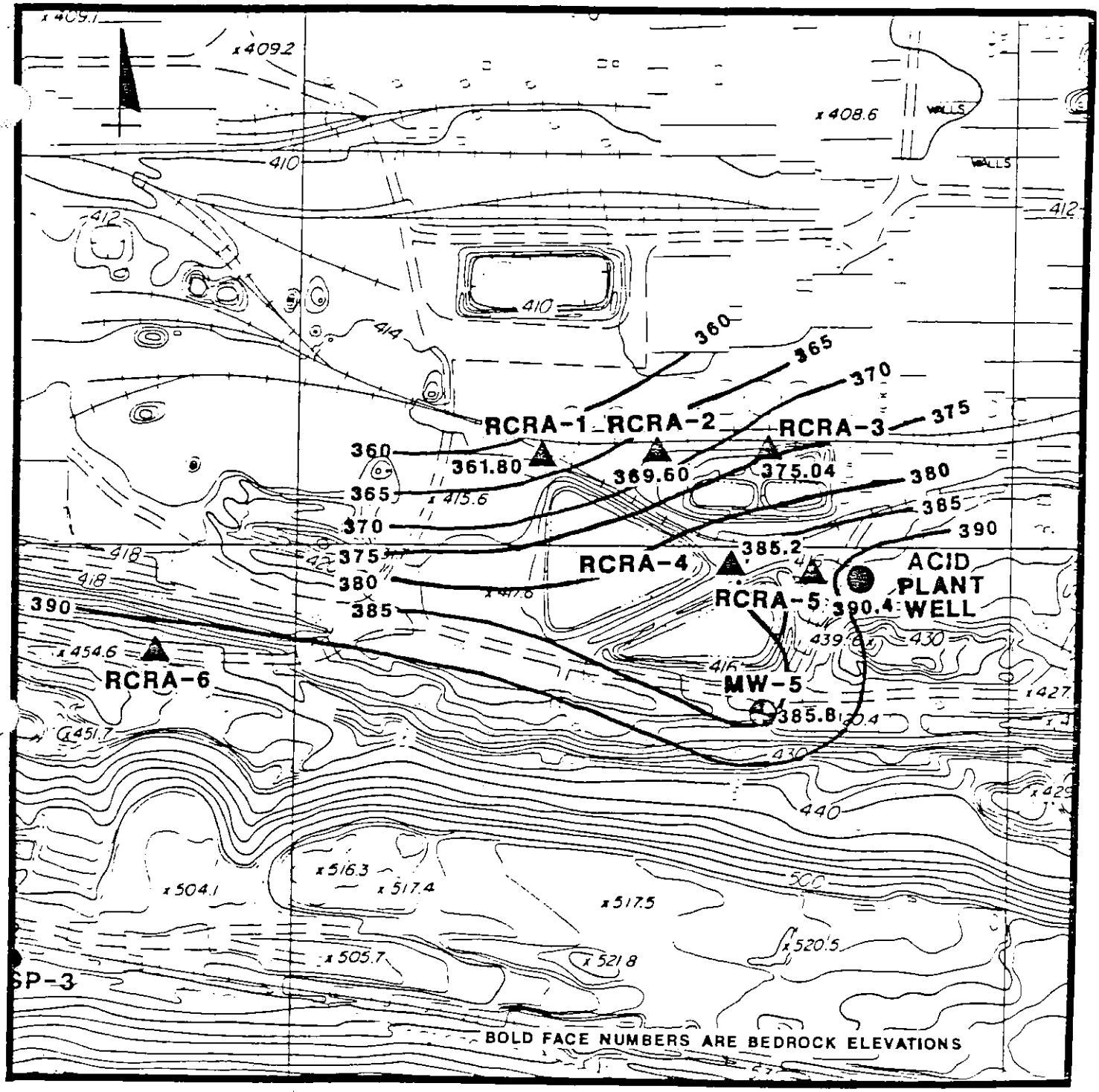

FIGURE 3

BEDROCK CONTOUR MAP

0 200'

SCALE

While the bedrock was found to be highly weathered in spots, no apparent confining layer between the unconsolidated glacial outwash and the underlying bedrock was noted.

Groundwater Hydrology

Any leakage which may occur from NJZ's former surface impoundments, would migrate vertically through the unsaturated fill and glacial outwash to groundwater within the glacial outwash unit. Upon reaching the groundwater, constituents from the impoundment would then move through the saturated materials in the direction of greatest decreasing hydrostatic head, along the available flow paths. In order to determine prevailing groundwater flow directions, water levels were measured in all monitoring wells surrounding the impoundments, and the head differentials contoured (Figure 4). From this information, it is clear that groundwater within the unconfined aquifer, in the vicinity of the impoundments, has a preferential flow direction from south-southeast to the north-northwest toward Aquashicola Creek, with a flow gradient of approximately a three (3) foot drop over a 400-foot distance, or a 0.75 percent slope.

In addition to this horizontal flow direction, measurement of water levels in the GEOMONS in RCRA-5 indicates that there is also a downward vertical flow component present in the surface impoundment area, as the shallow GEOMON had a groundwater elevation of 410.39 feet, the middle GEOMON 409.97 feet, and the deep GEOMON 409.18 feet.

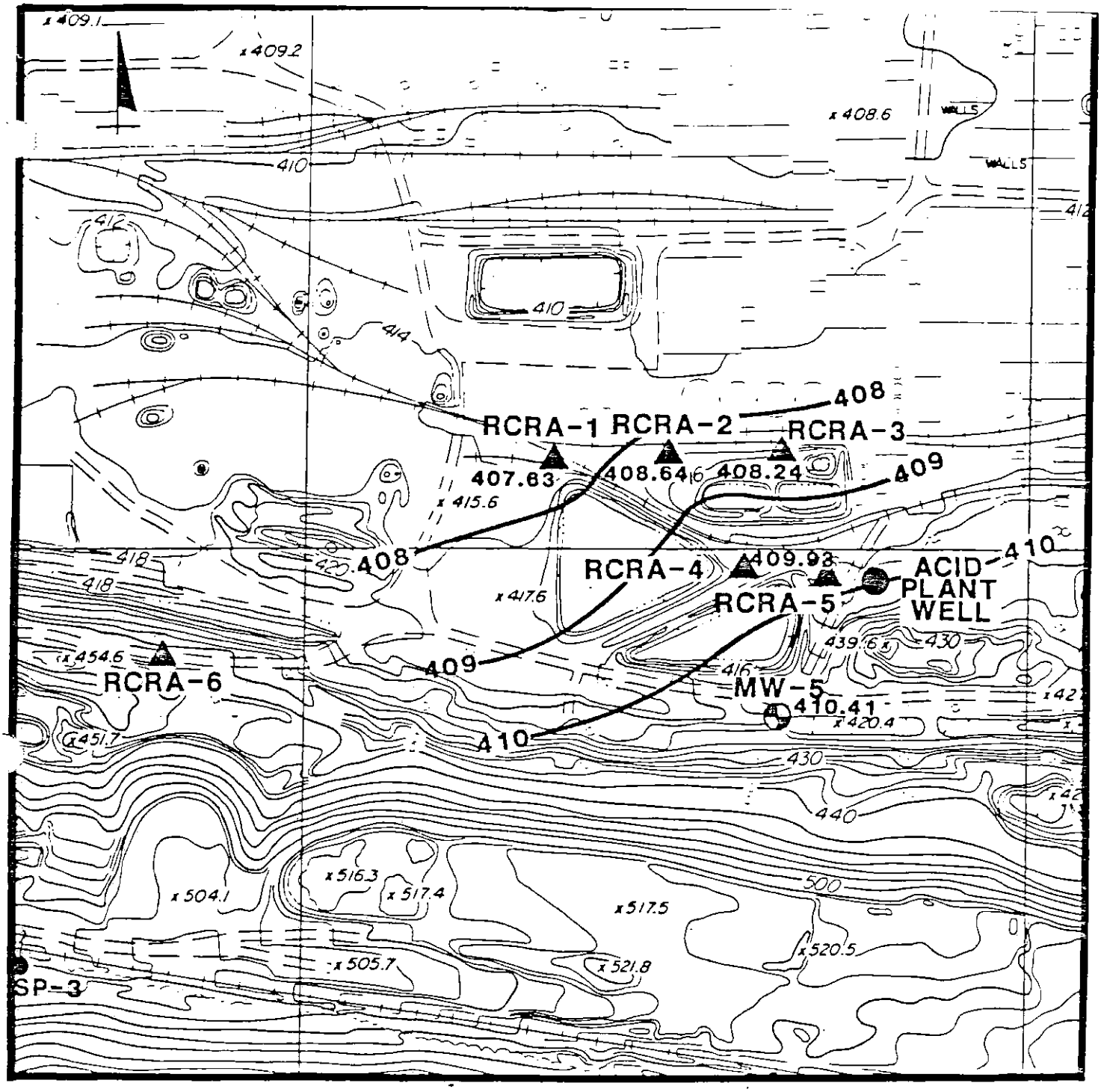

FIGURE 4

GROUNDWATER CONTOUR MAP

0 200'
SCALE

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Pumping Tests

In order to gain information concerning the hydraulic properties of the unconsolidated aquifer, a 72-hour Constant-Rate Pumping Test was conducted at RCRA-4, preceded by a short-term Step-Drawdown Test. To complete both tests, a 5 HP submersible pump was installed in RCRA-4 with its intake set at 30 feet below grade. Approximately 200 feet of discharge pipe was directed to a downgradient surface drain to remove the pumped water from the zone of pumping influence.

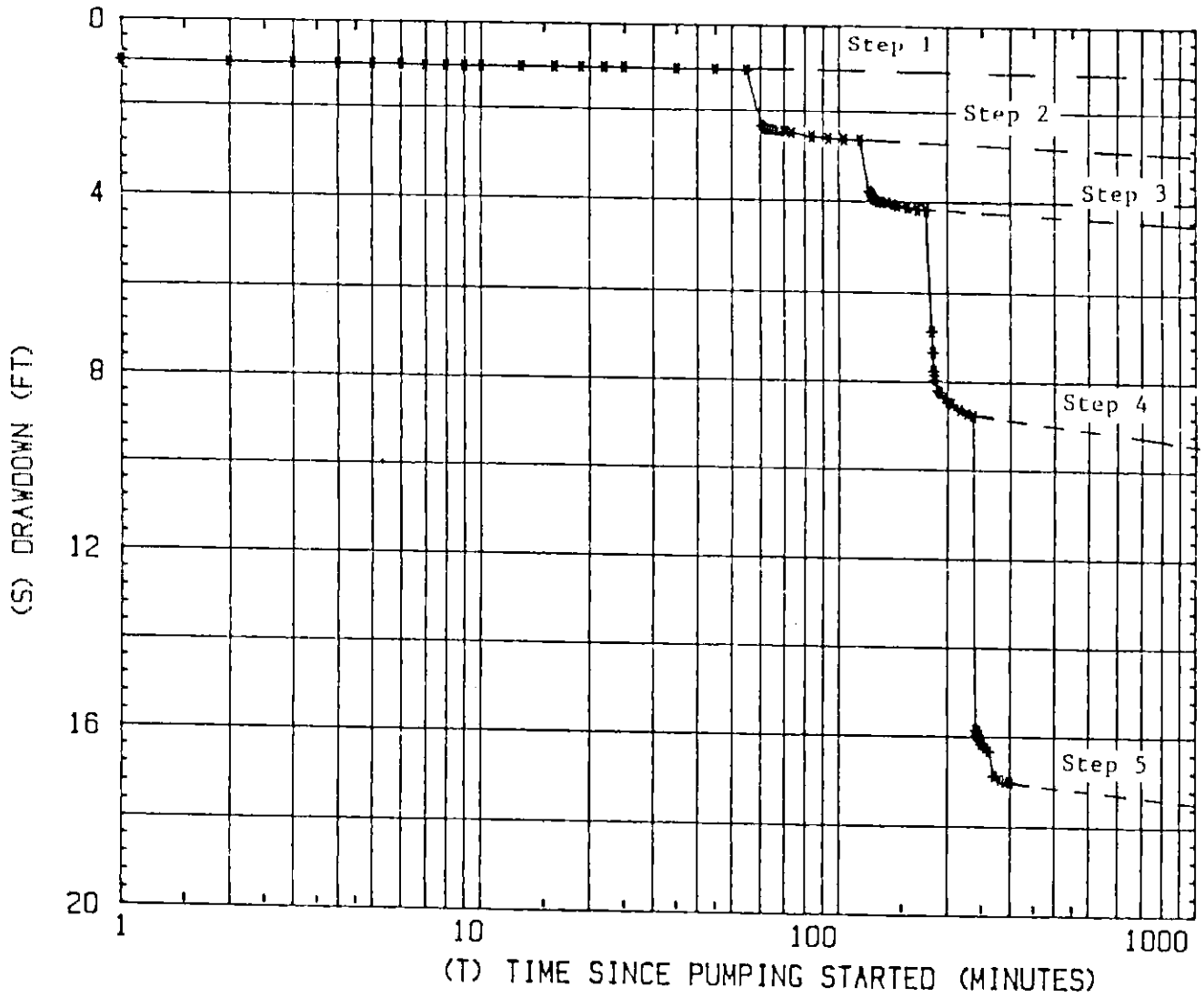
Step-Drawdown Pumping Test

The Step-Drawdown Test was conducted on May 20, 1986, for the purpose of determining an appropriate pumping rate for the Constant-Rate Pumping Test, as well as assessing overall well performance efficiency. The test was started with a pumping rate of ten (10) gallons per minute (gpm), which was maintained for one (1) hour, and followed by subsequent increases of 10 gpm, each maintained for a one-hour period, to 20, 30, 40, and finally 50 gpm. On the basis of data collected from this test (Figure 5), it was determined that the optimum long-term pumping rate would be 45 gpm.

Well Loss

In order to evaluate pumping test data and well efficiency, a well loss graph was constructed (Figure 6). Drawdown in a well is composed of formation loss and well loss. Formation loss is the drop (drawdown) in water level in the formation surrounding the well bore. Well loss is the additional water level drawdown in the well caused by friction loss associated with the

STEP TEST ANALYSIS RORABAUGH METHOD



Step #	Q (gpm)	S (ft)
1	10	1.19
2	20	2.95
3	30	4.55
4	40	9.55
5	50	17.69

PROJECT: NJZ RCRA STUDY
FILE: REWAI #8520
LOCATION: PALMERTON PA

WELL NO.: RCRA-4
S.W.L.= 10.46 FT

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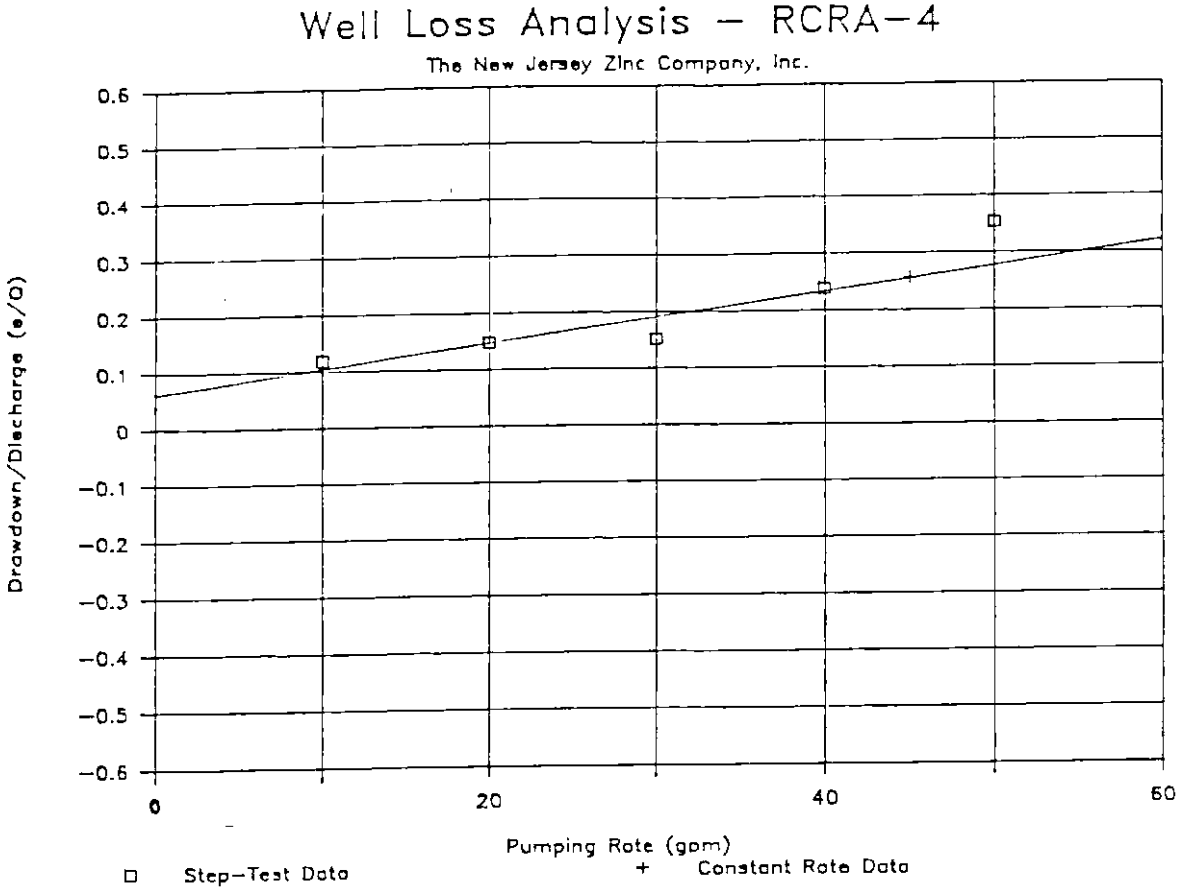
FIGURE 5

FIGURE 6



$$S = BQ + CQ^2 \quad \text{or} \quad s/Q = B + CQ$$

Where: s = Well Drawdown B = 0.06 (from graph)
BQ = Formation Loss C = 0.0043 (from graph)
CQ^2 = Well Loss

Q Discharge (gpm)	s Measured Drawdown (ft)	s' Calculated Drawdown (ft)	BQ Formation Loss (ft)	CQ^2 Well Loss (ft)	BQ/s'·100 Well Efficiency (%)
10	1.19	1.03	0.6	0.43	58
20	2.95	2.92	1.2	1.72	41
30	4.55	5.67	1.8	3.87	32
40	9.55	9.28	2.4	6.88	26
45	11.57	11.41	2.7	8.71	24
50	17.69	13.75	3.0	10.75	22

turbulence of converging flow through a smaller portion of the aquifer into the well bore.

From the step-drawdown data, values for well loss and well efficiency at varying pumping rates have been calculated and are shown on Figure 6. Well efficiency was computed by dividing the formation loss by the total drawdown.

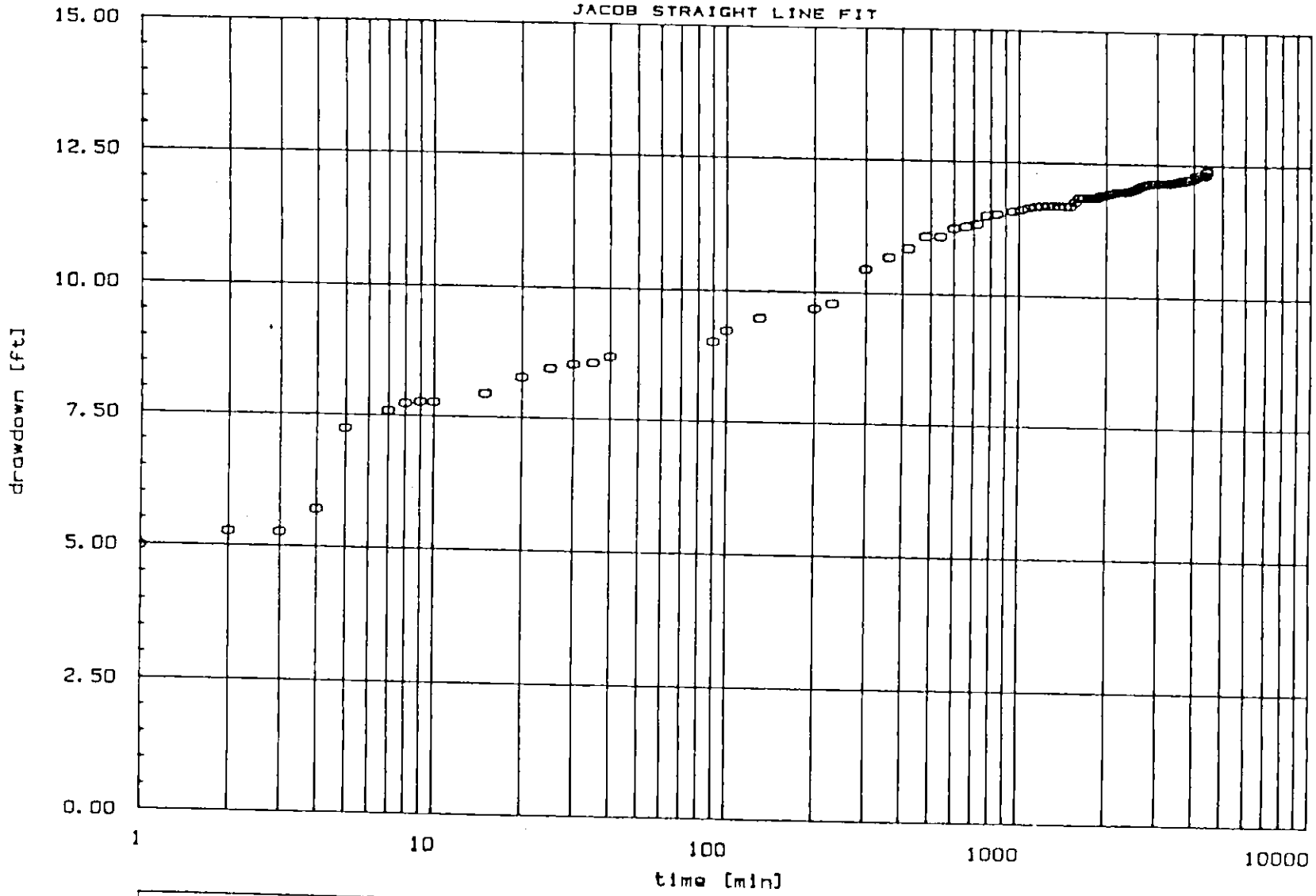
Constant-Rate Pumping Test

A 72-hour, Constant-Rate Test was initiated on Tuesday, May 27, 1986, and completed on Friday, May 30, 1986. During this test, the pumping rate of 45 gpm was frequently monitored by means of a totalizing flow meter attached to the discharge pipe, and cross checked using a bucket and stopwatch. Pumping water levels in the well were continuously recorded using a pressure transducer attached to a strip chart recorder, as well as by periodic manual measurements. All pumping well data is plotted on Figures 7 and 8.

Two important physical characteristics of the aquifer which are calculated from pumping test data are the Coefficient of Transmissivity (T) and the Storage Coefficient (S). These two values are important because they help define the hydraulic characteristics of the aquifer. The coefficient of transmissivity indicates how much water will move through the formation, and the storage coefficient indicates how much water can be removed by pumping or drainage.

In general, the drawdown portion of a pumping well's curve does not yield highly accurate transmissivity values due to well loss and inefficiency. However, values derived from the recovery

RCRA-4 DRAWDOWN ANALYSIS



PROJECT: 8520 N.J. Zinc Co.	WELL: RCRA-4	T = 10036 [gpd/ft]
LOCATION: Palmerton, PA	Q = 45 [gpm]	S = .581E-05
DATE: May 27, 1986	S.W.L. = 9.63 [ft]	FIGURE: 7

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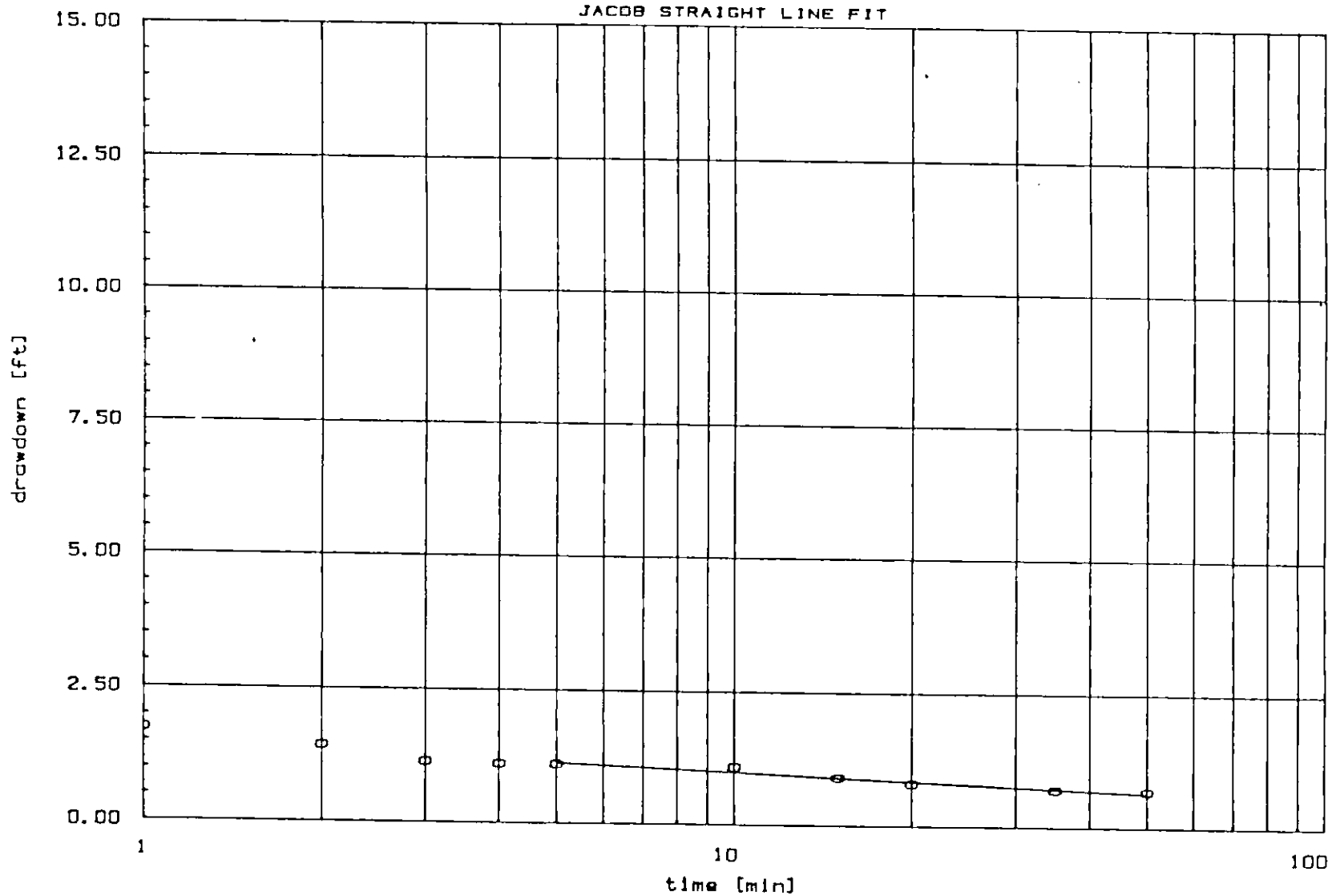
RCRA-4 RECOVERY ANALYSIS



PROJECT: 8520	WELL: RCRA-4	T = 23969 [gpd/ft]
LOCATION: PALMERTON PA	Q = 45 [gpm]	S = .227E-03
DATE: MAY 27, 1986	S.W.L. = 9.63 [ft]	FIGURE: 8

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portion of the pumping well curve and from time-drawdown data from observation wells is usually more reliable.

Slightly greater than twelve (12) feet of drawdown occurred in RCRA Well-4 during the 72-hour pump test. Calculating well loss from the step-test data, it is estimated that drawdown in the formation immediately surrounding RCRA Well-4 was approximately 2.7 feet. As well loss was quite large for RCRA Well-4, the transmissivity value calculated from the drawdown curve (10,000 gpd/ft) is probably quite low. When transmissivity is evaluated using the recovery data (Figure 8), a value of 24,000 gpd/ft is calculated, which is assumed to be a more reasonable average transmissivity for this portion of the glacial outwash aquifer.

Observation Wells

During the course of the 72-hour Constant Rate Pumping test, nearby wells were continuously monitored.

RCRA-1 is located 305 feet to the northwest of the pumping well (RCRA-4) and was originally installed as a downgradient RCRA monitoring well for the surface impoundments. During the first 1,000 minutes of the test, the water level in this well was lowered approximately 0.32 feet, and then stabilized with no additional drawdown occurring over the remainder of the pumping test (Figure 9). This stabilization is believed to be due to recharge from a thicker, more permeable portion of the aquifer, as well as artificial recharge from the leaking impoundments.

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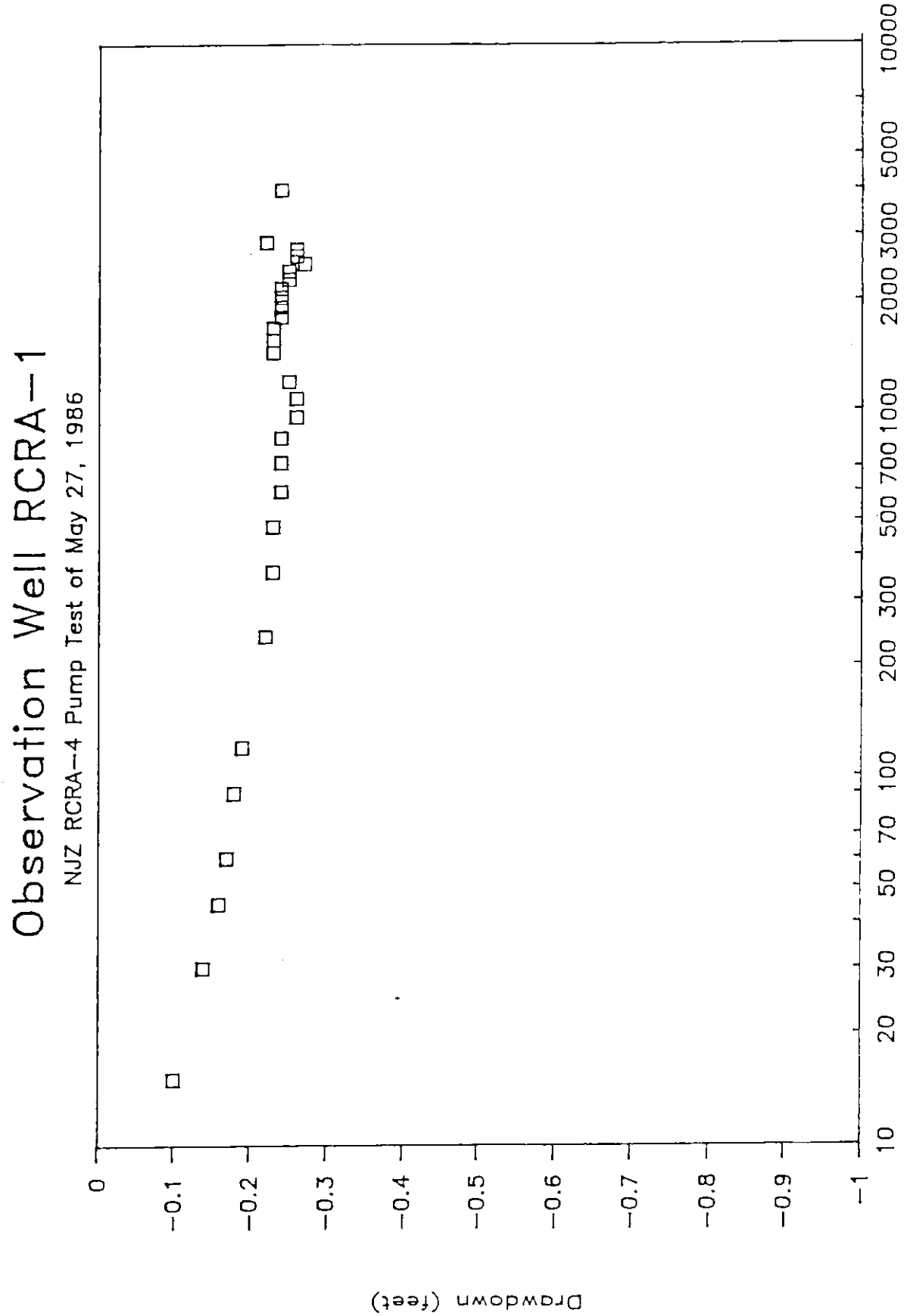

Observation Well RCRA-1
NJZ RCRA-4 Pump Test of May 27, 1986
Drawdown (feet)
0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
-0.8
-0.9
-1
10
20
30
50
70
100
200
300
500
700
1000
2000
3000
5000
10000
Log Time (minutes)

FIGURE 9

RCRA-2 is located 195 feet north-northwest of the pumping well (RCRA-4) and was also originally installed as a downgradient monitoring well for the Waste Management Area. During the first 600 minutes of the test, the water level in this well was lowered 0.41 feet, and then essentially stabilized (Figure 10). As with RCRA-1, this stabilization is believed to also be due to recharge from a thicker, more permeable portion of the aquifer and artificial recharge from the leaking impoundments.

RCRA-3 is located 175 feet north-northeast of the pumping well (RCRA-4) and was originally installed as the third required downgradient monitoring well for the Waste Management Area. Similar to RCRA-2, during the first 600 minutes of the test, the water level in this well was lowered 0.14 feet, and then essentially stabilized (Figure 11).

MW-5 is located 210 feet south-southeast of the pumping well (RCRA-4) and was installed as the required upgradient monitoring well for the Waste Management Area, as well as a CERCLA monitoring well for the waste pile. During the constant-rate pumping test, a total of 0.73 feet of drawdown occurred in this well and unlike the downgradient wells, at no time did water levels stabilize in MW-5 (Figure 12). The continued drawdown observed in this well during the course of the long-term pump test is believed to be due to a "thinning" of the glacial aquifer against Blue Mountain to the south, as well as the lack of any potential artificial recharge source.

The final RCRA monitoring well to be monitored during the constant rate test was RCRA-5, located 110 feet east of the pumping well (RCRA-4). This well was originally installed to monitor the vertical flow gradient in the surface impoundment

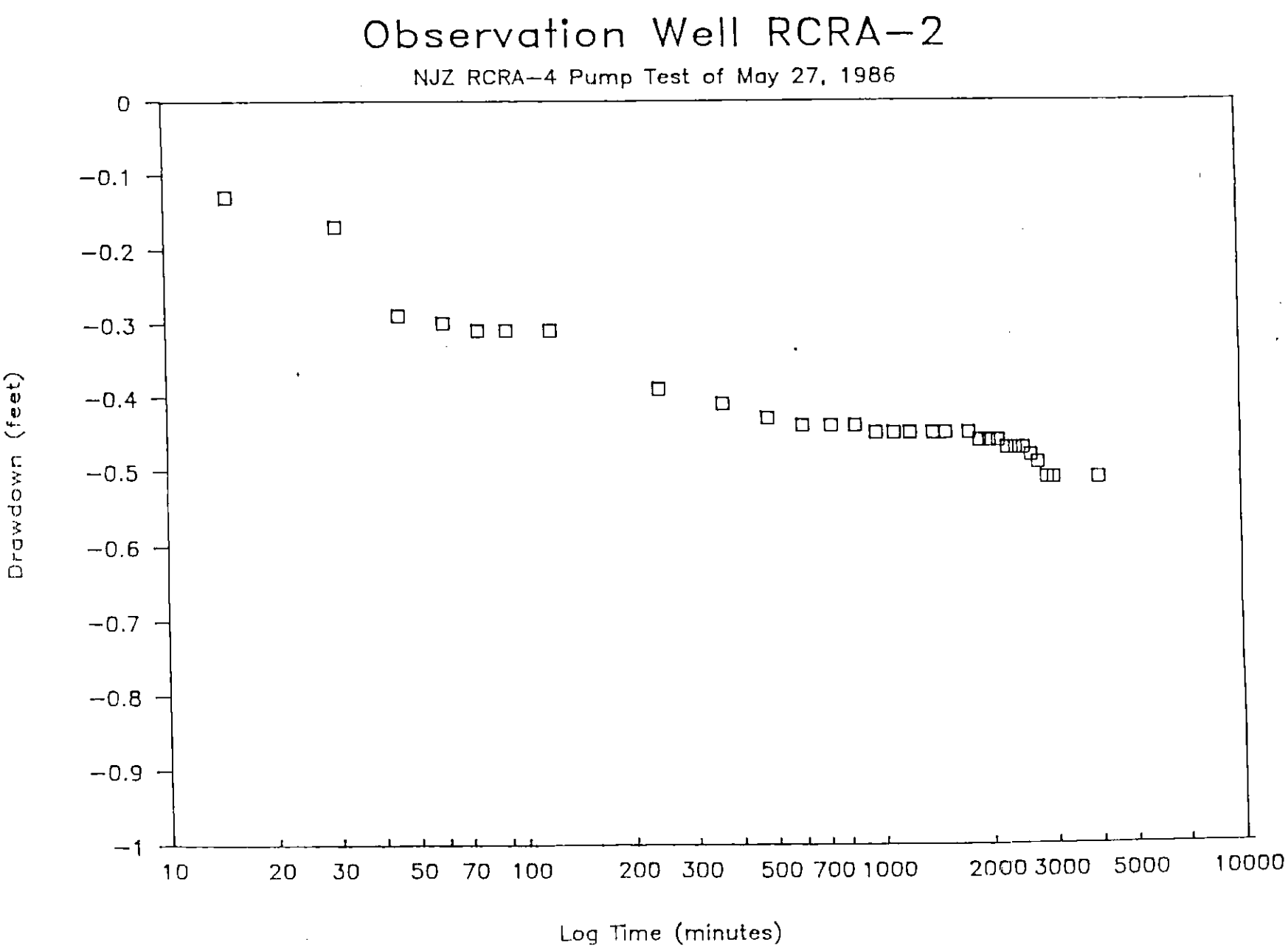

Observation Well RCRA-2
NJZ RCRA-4 Pump Test of May 27, 1986
Drawdown (feet)
0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
-0.8
-0.9
-1
10
20
30
50
70
100
200
300
500
700
1000
2000
3000
5000
10000
Log Time (minutes)

FIGURE 10

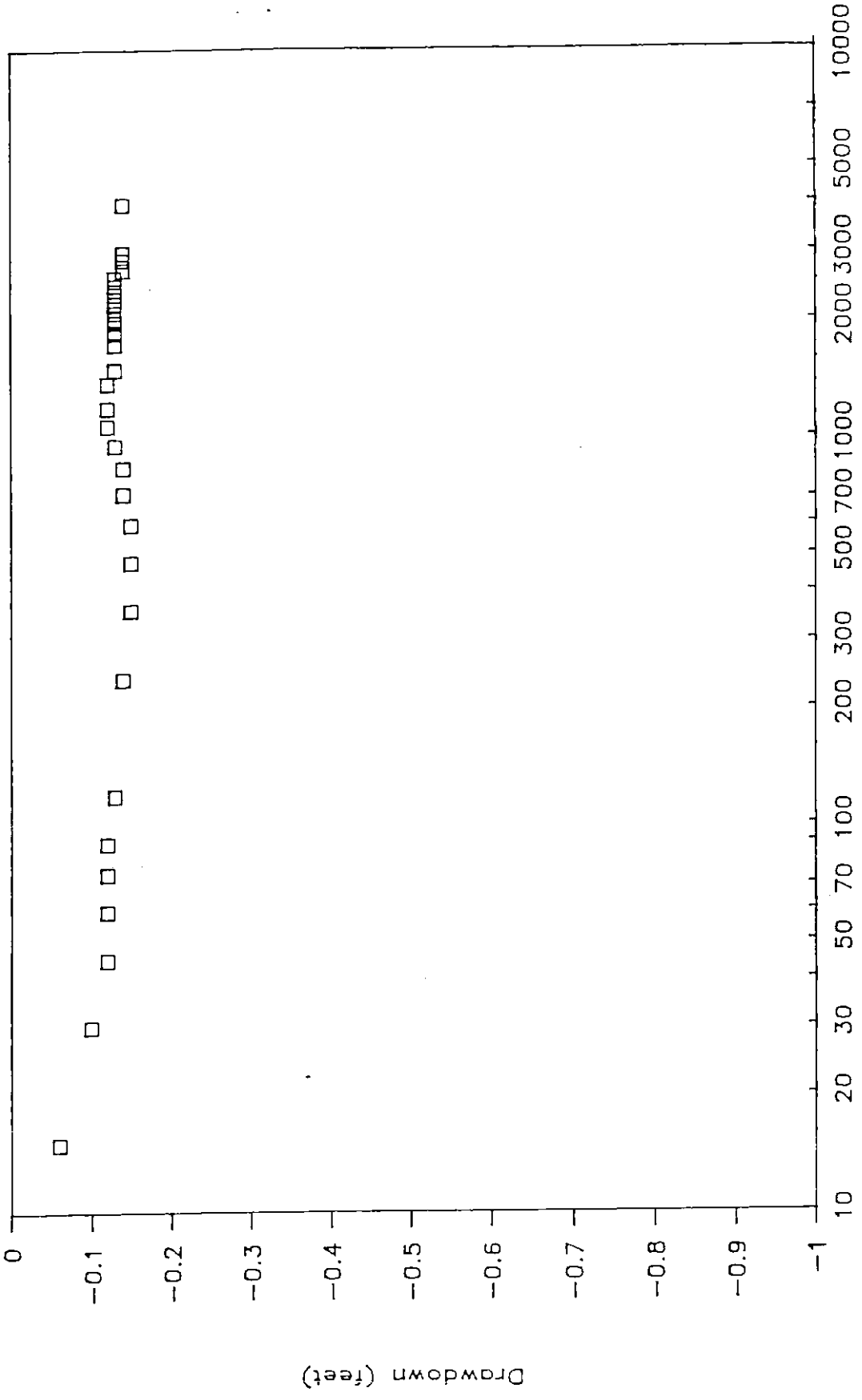

Observation Well RCRA-3
NJZ RCRA-4 Pump Test of May 27, 1986
Drawdown (feet)
0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
-0.8
-0.9
-1
10
20
30
50
70
100
200
300
500
700
1000
2000
3000
5000
10000
Log Time (minutes)

FIGURE 11

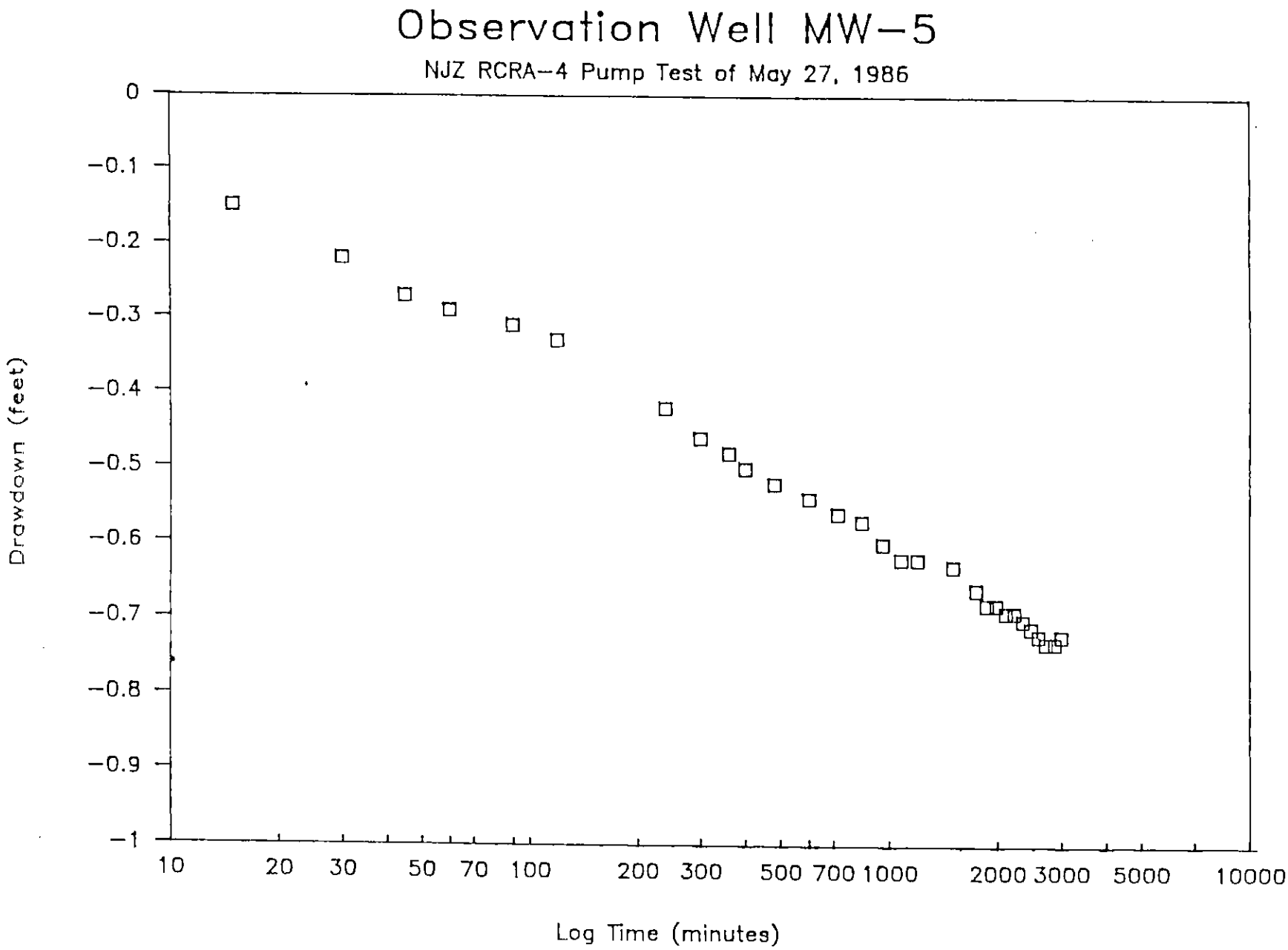

Observation Well MW-5
NJZ RCRA-4 Pump Test of May 27, 1986
Drawdown (feet)
0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
-0.8
-0.9
-1
10
20
30
50
70
100
200
300
500
700
1000
2000
3000
5000
10000
Log Time (minutes)

FIGURE 12

area. Three (3) GEOMON Samplers were installed at different levels in this well and physically isolated from each other, to attain head measurements at specific depths. Since no confining layers were apparent during drilling, the GEOMONS were set approximately equal distances apart in the well bore. Pre-pumping measurements revealed a downward flow component.

During the pumping test, approximately 0.40 feet of drawdown was measured in the deep GEOMON, 0.86 feet of drawdown in the middle GEOMON, and 0.63 feet of drawdown in the shallow GEOMON (Figure 13), indicating vertical variation in the unconsolidated aquifer.

Finally, the Palmer Water Company's "Acid Plant" well, which is a deep bedrock municipal supply well, was also monitored during the constant-rate pumping test. This well is located approximately 150 feet east of RCRA-4 and is reportedly 685 feet deep and cased to a depth of approximately 72 feet. Reportedly, when this well was drilled in 1957, it had a natural artesian flow of 25 gpm ("Geological Correlation of Data on Water Well Drilled at the East Plant in 1957," The NJZ Company Research Dept. Report, 1960). As this well is an integral part of the Palmer Water Company system, it could only be taken out of service for a limited time during the RCRA-4 pumping test. Water levels recorded in this well during the RCRA-4 pumping test exhibited recovering levels throughout the test. At no time was there any evidence to suggest that continued pumping in the shallow aquifer affected water levels in the deep bedrock aquifer.

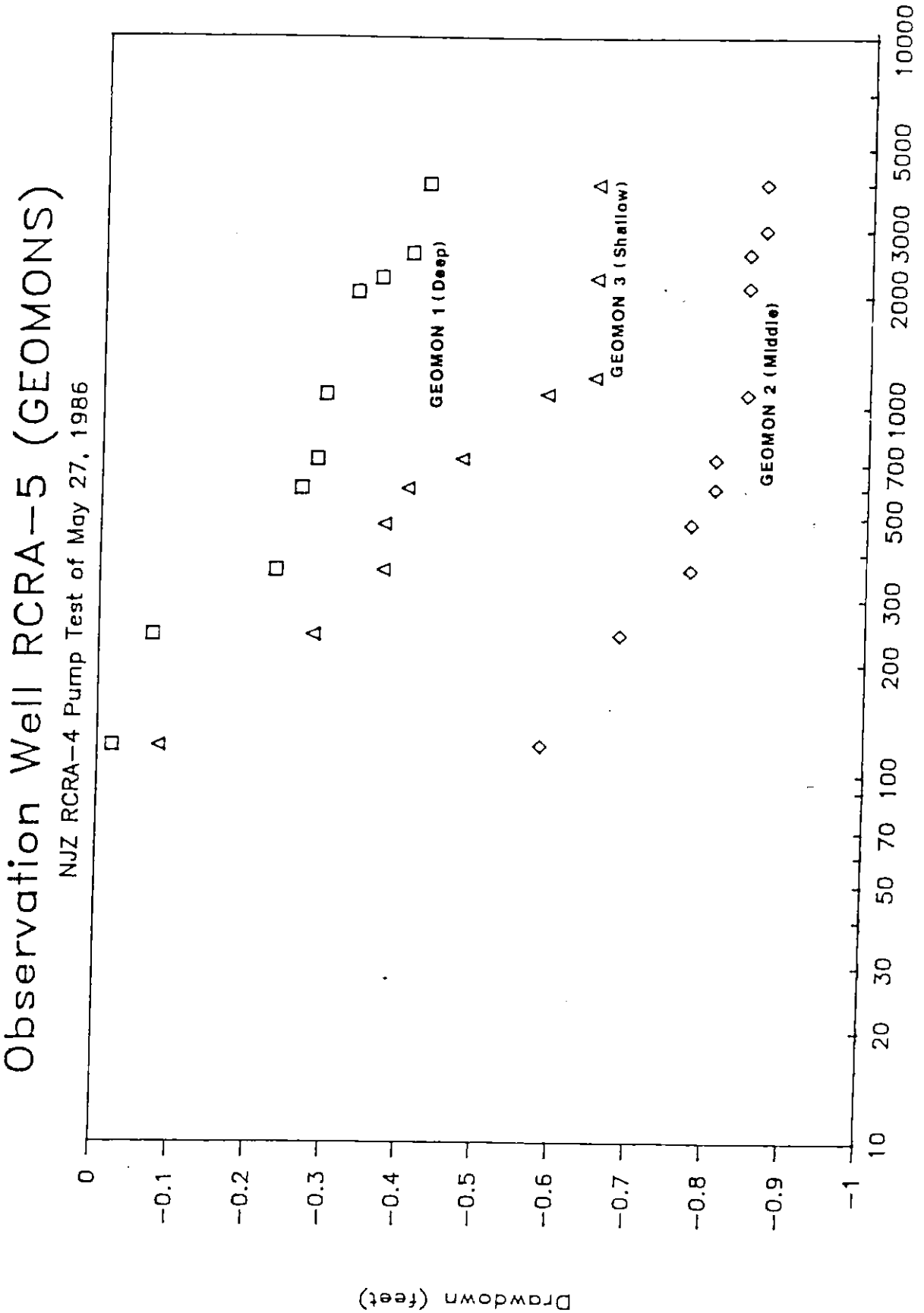

Observation Well RCRA-5 (GEOMONS)
NUZ RCRA-4 Pump Test of May 27, 1986
Drawdown (feet)
0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
-0.8
-0.9
-1
10
20
30
50
70
100
200
300
500
700
1000
2000
3000
5000
10000
Log Time (minutes)
GEOMON 1 (Deep)
GEOMON 3 (Shallow)
GEOMON 2 (Middle)

FIGURE 13

Distance Drawdown Evaluation

Throughout the course of the constant-rate test water levels in nearby monitoring wells were monitored. This drawdown data is useful in determining the zone of influence surrounding RCRA-4 during pumping. In order to determine the potential impact, the drawdown data from the pumping well was first corrected for well loss. As calculated earlier, actual drawdown in the aquifer near RCRA-4 was determined to be 2.7 feet (Figure 6). The extent of the zone of influence was determined by plotting the aquifer drawdown at the pumping well and projecting it through drawdowns plotted from observation well data. Figure 14 shows these projections on a distance-drawdown graph for observation wells near the Waste Management Area. Figure 15 exhibits similar information in map view.

The area impacted by pumping during the RCRA-4 constant rate test is quite large, being approximately 600,000 square feet. It is also evident, from the shape of the zone of influence, that aquifer properties are not homogeneous in the vicinity of the Waste Management Area. The elongation of the zone of influence in a northwesterly direction is most likely due to a more permeable material (i.e., coarse sand and gravel) that occurs in this direction. The flattening of the zone of influence to the south is caused by a bedrock/colluvial boundary along Blue Mountain. It is in this area that the glacial outwash aquifer pinches out against Blue Mountain.

In addition, RCRA-3 exhibited very little drawdown (0.14 feet) during the constant rate test at RCRA-4, as is evidenced by the close proximity of the zone of influence to RCRA-3. This may be related to recharge from the former settling impoundments located

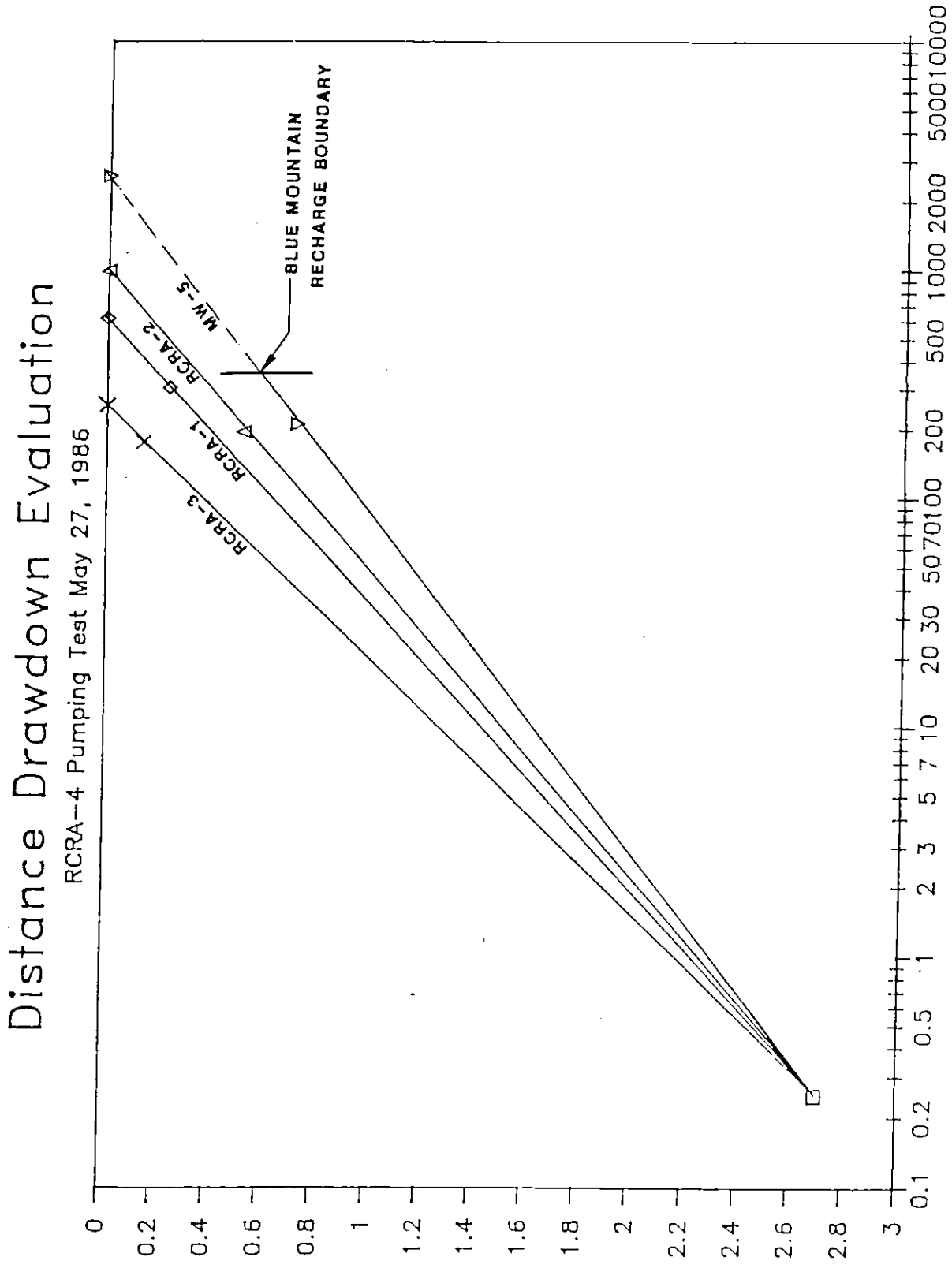

Distance Drawdown Evaluation
RCRA-4 Pumping Test May 27, 1986
BLUE MOUNTAIN
RECHARGE BOUNDARY
MW-5
RCRA-2
RCRA-1
RCRA-3
Drawdown (feet)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
2.2
2.4
2.6
2.8
3
0.1
0.2
0.5
1
2
3
5
7
10
20
30
50
70
100
200
500
1000
2000
5000
10000
Distance (feet)

FIGURE 14

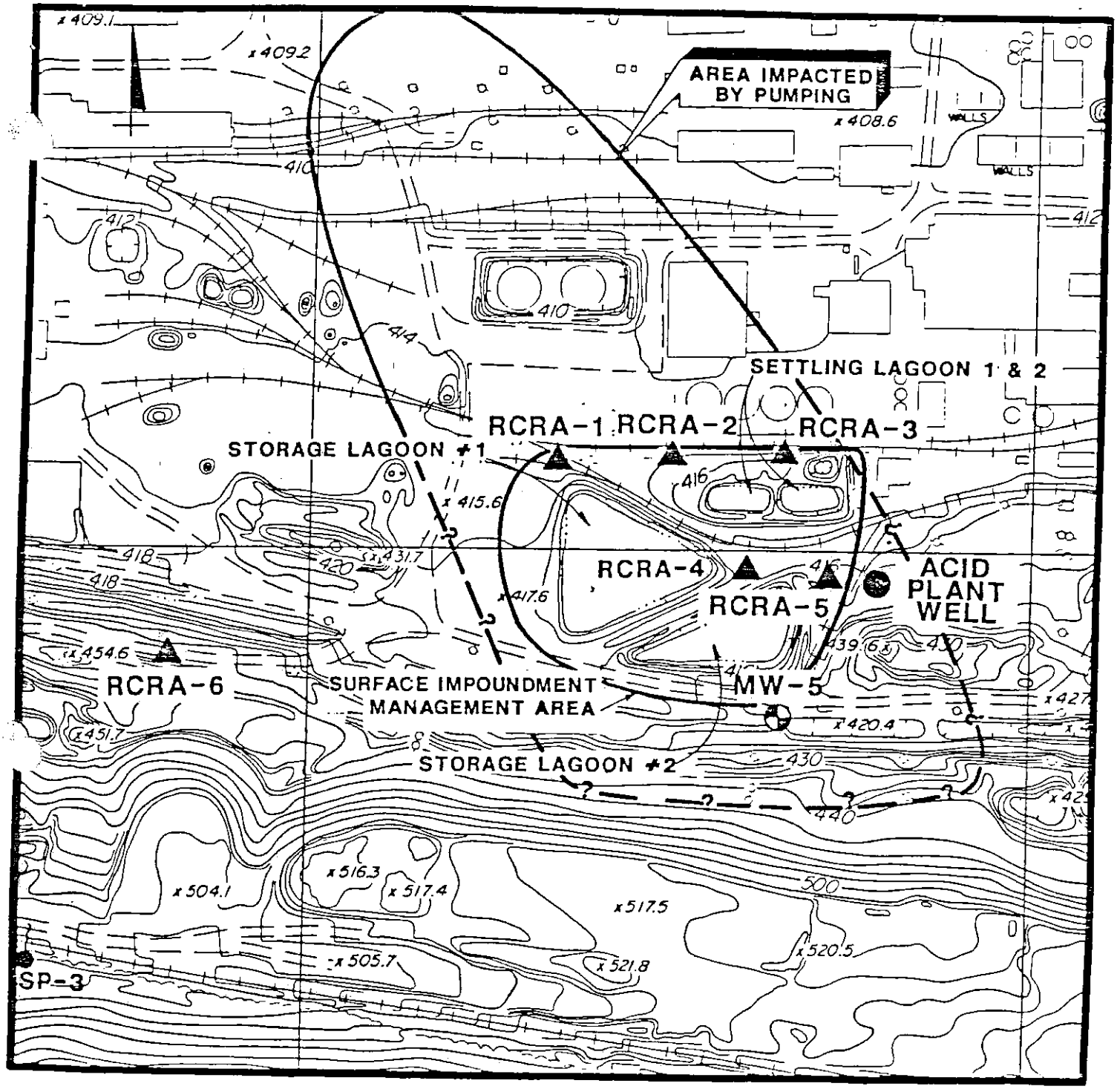


FIGURE 15

MAP SHOWING AREA IMPACTED BY PUMPING
DURING RCRA-4 PUMP TEST

0 200'
SCALE

r.e. wright associates, inc.

in this area. Leakage from these impoundments would provide a nearby source of water (recharge) which would not necessitate expansion of the zone of influence in this area. Water chemistry for RCRA-3 (included in Addendum) also supports to probability of leakage from the settling impoundments. The narrowness of the zone of influence is also believed due in part to less permeable materials occurring east and west of RCRA-4.

Pumping Test Water Chemistry

During the course of the Constant-Rate Pumping test, groundwater samples from RCRA-4 were collected at approximately six (6) hour intervals by REWAI personnel, for analysis of dissolved cadmium, copper, lead, manganese, and zinc. All samples were collected in accord with EPA and DER established guidelines and criteria for sampling and analyzed to evaluate any trends in water quality changes which occurred during pumping. Graphically summarized, these results are included as Figures 16, 17, 18 and 19. Copies of all laboratory reports are included as Appendix II. Copper was the only parameter found at levels below EPA drinking water standards. All other analyzed parameters exceeded safe drinking water standards as set by EPA. Manganese values ranged from 108 to 120 mg/l (EPA standard for drinking water for manganese is 0.05 mg/l-40 CFR Part 143.3). Zinc concentrations ranged from 880 to 1000 mg/l (EPA standard for zinc in drinking water is 5.0 mg/l-40 CFR Part 143.3). Cadmium concentrations ranged from 2.10 to 2.48 mg/l (EPA standard for cadmium in drinking water is 0.010 mg/l-40 CFR Part 141.11). Finally, lead concentrations ranged from 0.03 to 0.24 mg/l (EPA standard for lead in drinking water is 0.05 mg/l-40 CFR Part 141.11).

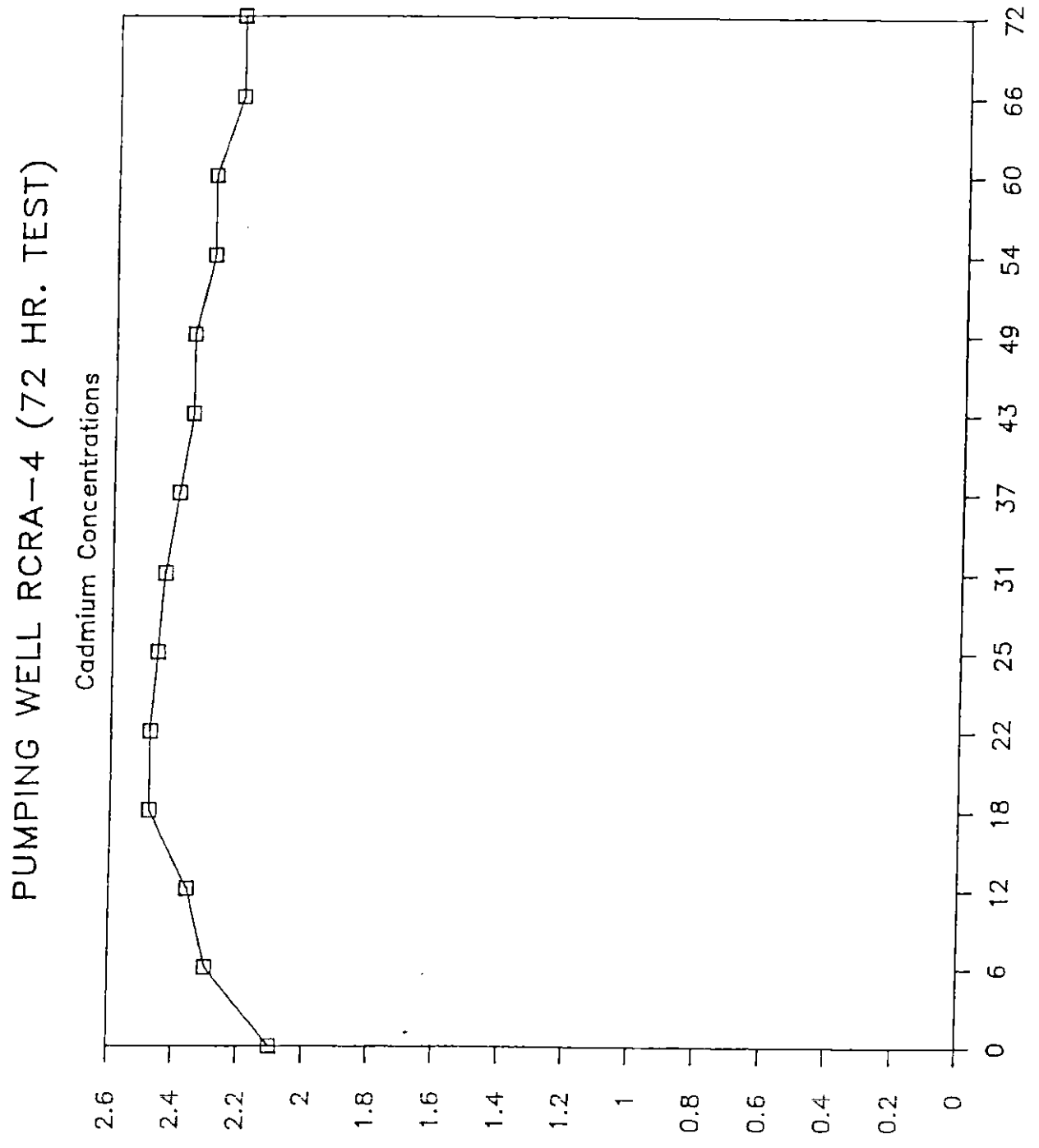

PUMPING WELL RCRA-4 (72 HR. TEST)
Cadmium Concentrations
Concentrations (mg/l)
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0
6
12
18
22
25
31
37
43
49
54
60
66
72
Time (Hrs. since start)

FIGURE-16

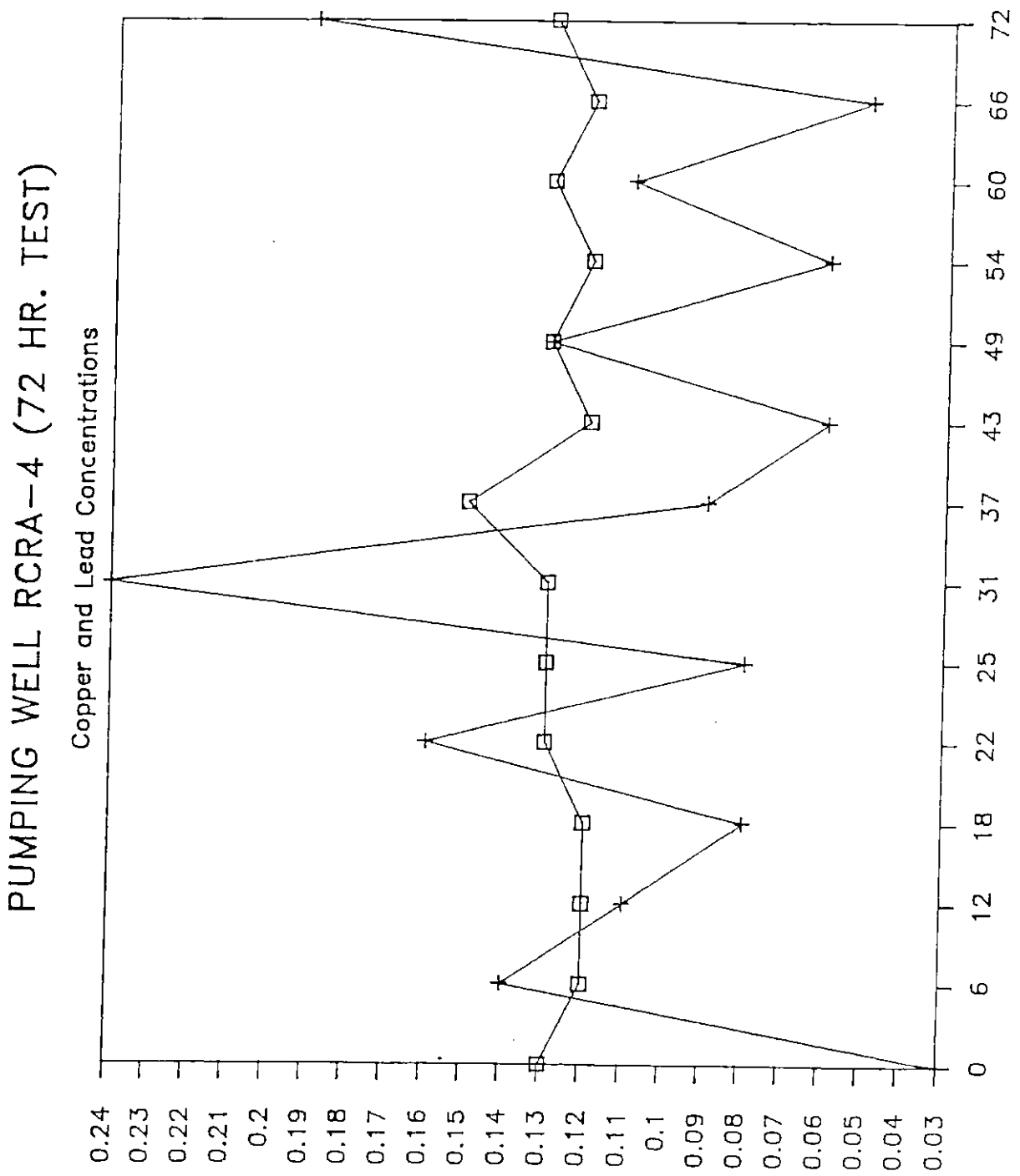

PUMPING WELL RCRA-4 (72 HR. TEST)
Copper and Lead Concentrations
Concentrations (mg/l)
0.24
0.23
0.22
0.21
0.2
0.19
0.18
0.17
0.16
0.15
0.14
0.13
0.12
0.11
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0
6
12
18
22
25
31
37
43
49
54
60
66
72
Time (Hrs. since start)
Copper
Lead

FIGURE 17

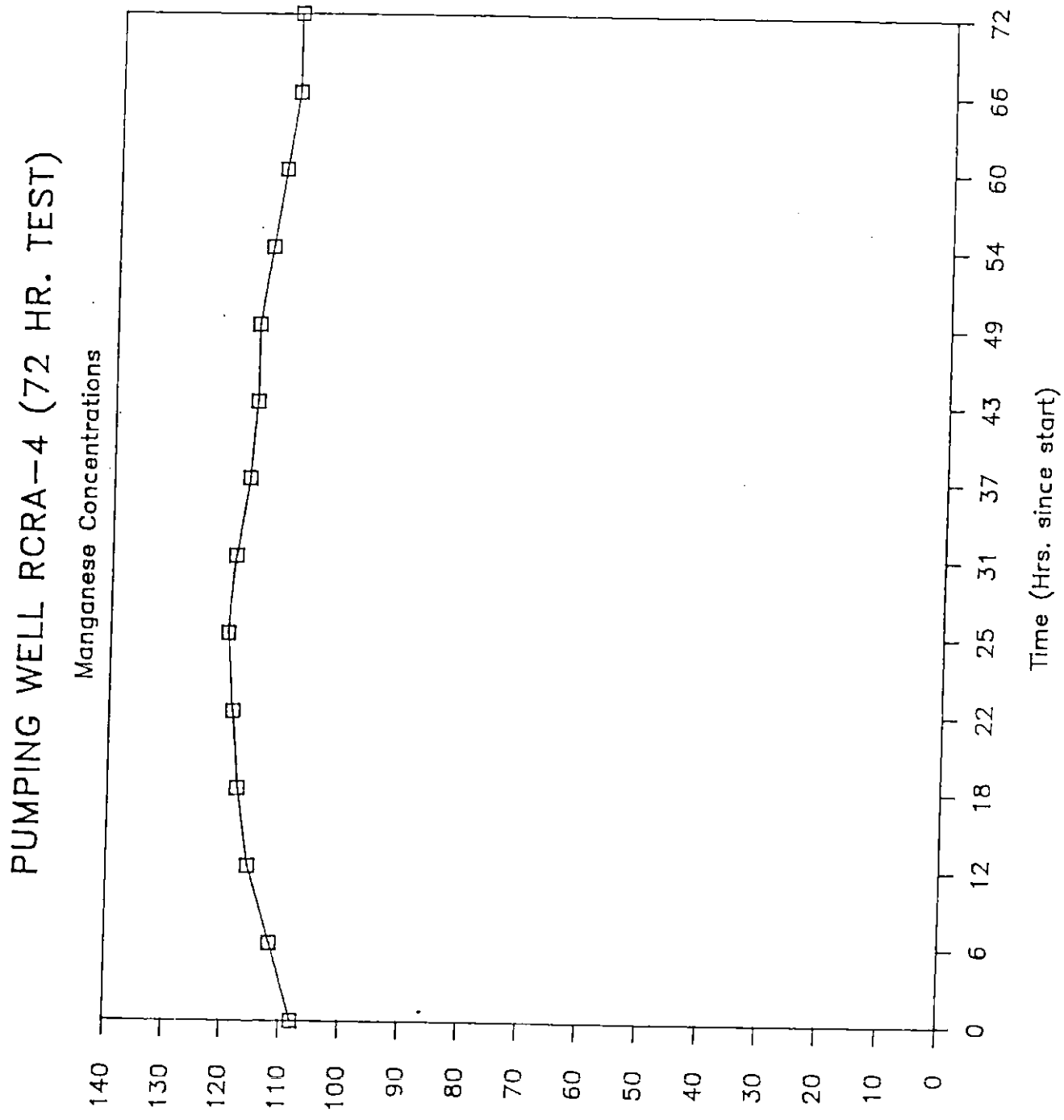

PUMPING WELL RCRA-4 (72 HR. TEST)
Manganese Concentrations
Concentrations (mg/l)
Time (Hrs. since start)
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
0
6
12
18
22
25
31
37
43
49
54
60
66
72

FIGURE 18

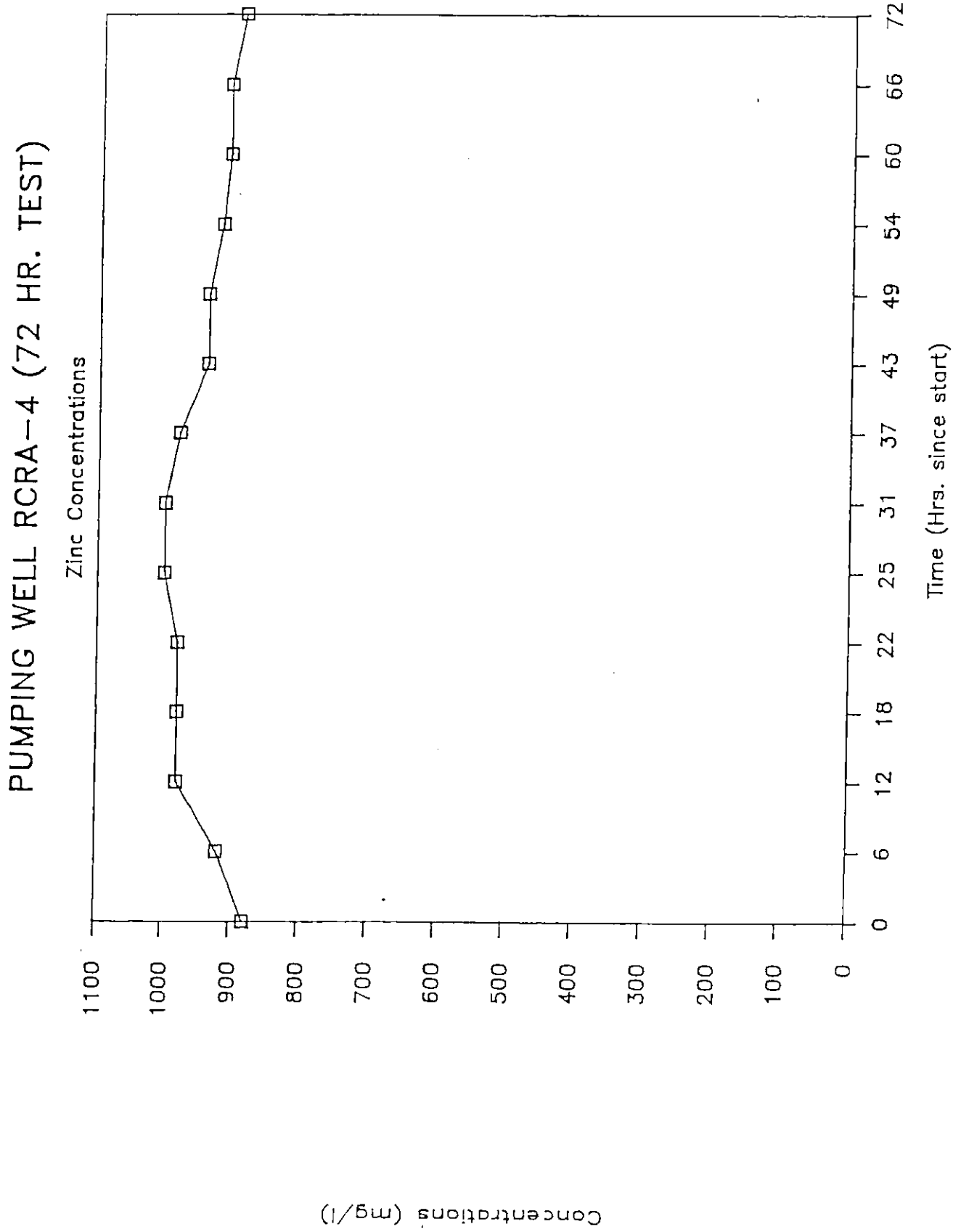

PUMPING WELL RCRA-4 (72 HR. TEST)
Zinc Concentrations
Concentrations (mg/l)
1100
1000
900
800
700
600
500
400
300
200
100
0
0
6
12
18
22
25
31
37
43
49
54
60
66
72
Time (Hrs. since start)

FIGURE 19

The fact that metal concentrations only decreased slightly over the course of the 72-hour constant rate pumping test indicates relatively consistent levels of the parameters of concern within the zone of pumping.

DISCUSSION OF FINDINGS

New Jersey Zinc's East Plant surface impoundments are underlain by a sequence of artificial fill, Wisconsinan glacial outwash, and Bloomsburg shale, siltstone and sandstone. This sequence, while appearing fairly homogeneous, is actually quite complex. Evidence for facies changes within the glacial outwash aquifer were shown by the different responses in the GEOMON water levels during the 72-hour pumping test and different responses in observation well water levels during the 72-hour pump test. It is also evident from the continued lowering of the water level in MW-5 during the 72-hour pump test, that the glacial outwash aquifer pinches out against Blue Mountain to the south of the surface impoundments. Bedrock and colluvium from Blue Mountain are in effect acting as a negative recharge boundary. Monitoring of downgradient observation wells (RCRA-1, RCRA-2 and RCRA-3) indicate a thickening of the glacial outwash aquifer towards Aquashicola Creek, as shown by water levels which stabilized during the 72-hour pump test.

The constant-rate pumping test indicates that the glacial outwash aquifer is quite permeable, as evidenced by an average transmissivity value of 23,969 gpd/ft. However, this permeability is not homogeneous throughout the unconsolidated aquifer. As shown by the distance-drawdown evaluation, there is a preferred permeability direction which trends southeast to northwest. This preferred direction is most likely caused by a thickening of the glacial outwash aquifer, and also roughly aligns itself with a suspected bedrock trough which also trends

southeast to northwest. A deeper bedrock surface in this direction would allow for a thicker glacial outwash unit. That the zone of influence does not reach farther east or west could be caused by a facies change to less permeable materials or, on the eastern side, by leakage from the settling impoundments.

Groundwater in the surface impoundment area has a horizontal flow direction from the southeast to the northwest toward Aquashicola Creek. This flow direction also coincides with the preferential permeability direction. In addition, a downward vertical flow component was observed at the RCRA-5 GEOMONS. This downward flow may be natural or it may be caused by pumping at the Palmer Water Company's Acid Plant Well.

Evidence for impoundment leakage is shown by the limited drawdown of RCRA-3 and groundwater quality analyses included in the addendum. As water levels in RCRA-3 stabilized quickly, with only 0.14 feet of drawdown, it is believed that the settling impoundments act as a recharge source. If there was no leakage from the impoundment, the zone of influence presumably would extend further in this direction. Secondly, groundwater quality from the first quarterly RCRA sampling revealed no cadmium, manganese, and very little zinc in RCRA-3, while the other RCRA wells had elevated levels of these constituents.

All groundwater quality parameters measured were found to remain fairly constant during the constant-rate pumping test, with only a slight decline in levels occurring over the last few hours. With the exception of copper, all parameters typically exceeded safe drinking water standards as set by EPA. In addition, high metal concentrations were present in both the upgradient monitoring well (MW-5) and two (2) downgradient monitoring wells

(RCRA-1 and RCRA-2); however, values were greater in the two (2) downgradient monitoring wells. This indicates that groundwater quality in the vicinity of the Surface Impoundment Management Area is apparently related to former leakage from the surface impoundments.

Summary of Findings

Site Geology

In accordance with Pennsylvania Department of Environmental Resources (PADER) Rules and Regulations, one (1) hydraulically upgradient and three (3) hydraulically downgradient groundwater quality monitoring wells were installed at New Jersey Zinc's East Plant Waste Management Area. Two (2) additional wells were drilled and constructed to acquire additional hydrogeologic information pertaining to the underlying aquifer.

Geologic information attained during the drilling shows the surface impoundment area at NJZ's East Plant is underlain by a moderately thick sequence of unconsolidated materials consisting of artificial fill and Wisconsinan glacial outwash overlying bedrock of the Bloomsburg Formation.

Fill is primarily dark gray to black cinders, slag, and clinkers and was found to thin in a northward direction away from the cinder bank. Thickness ranged from seven feet at MW-5 to 0 feet at RCRA-3.

Directly underlying the fill was Wisconsinan glacial outwash. This unit was divided into three (3) distinct subunits based upon its gravel and cobble content. The uppermost subunit consists of

a silty, sandy gravel with numerous cobbles and boulders. Thickness ranges from seven feet at RCRA-1 and RCRA-5 to 15 feet at RCRA-3. The middle subunit consists of silty, gravelly sand with some cobbles. Thickness of the middle subunit ranges from 11 feet at RCRA-3 to 22 feet at RCRA-1. The third or lower subunit consists of slightly clayey, silty, fine to medium grained sand with occasional gravel. Thickness of this subunit ranges from 22 feet at RCRA-1 to 0 feet at RCRA-5.

The entire Wisconsinan glacial outwash unit pinches out against Blue Mountain to the south and thickens towards Aquashicola Creek to the north-northwest. Variability within the outwash unit is exhibited by the presence of clay lenses and gravel layers which are present in some borings but absent in others. In addition, water was encountered in the Wisconsinan glacial outwash unit in all wells drilled in the Surface Impoundment Management Area.

Underlying the Wisconsinan glacial outwash, in the vicinity of the surface impoundment area, is bedrock of the Ordovician Bloomsburg Formation, consisting primarily of shale, siltstone and fine-grained sandstone. This rock is, in general, highly fractured and depth to the bedrock surface is irregular, varying between 28 feet at RCRA-5 to 52 feet at RCRA-1. Generally, depth to bedrock increases in a north to northwest direction away from MW-5. A small northwest-southeast trending bedrock trough is also believed to exist in the Surface Impoundment Management Area.

No confining layers were evident between any of the geologic units present at NJZ's surface impoundment site.

Groundwater Hydrology - Water levels were measured in all monitoring wells surrounding the surface impoundments. From this information it was evident that groundwater within the unconfined aquifer, in the vicinity of the surface impoundments, flows from the south-southeast to the north-northwest toward Aquashicola Creek, with a flow gradient exhibiting a slope of 0.75 percent.

In addition to this horizontal flow direction, measurement of water levels in the multi-level GEOMONS in RCRA-5 indicates a downward vertical flow component also exists in the surface impoundment area.

In order to gain additional information concerning the hydraulic properties of the unconsolidated aquifer a short-term Step-Drawdown Test followed by a 72-hour constant-rate pumping test was conducted at RCRA-4.

Data obtained from the Step-Drawdown Test was used to determine a pumping rate of 45 gpm for the long-term constant-rate pumping test. In addition, a drawdown of 2.7 feet in the formation immediately surrounding the pumping well and a well efficiency of 24 percent were calculated from Step-Test data.

Data obtained from the 72-hour pumping test conducted at RCRA-4 were used to determine values of average aquifer transmissivity and storativity, calculated to be 23,969 gpd/ft and .000227, respectively. It was determined from analysis of distance-drawdown relationships, that groundwater in approximately a 600,000 square foot area was influenced by pumping at RCRA-4 during the constant rate test. This zone of influence also indicates that the unconsolidated aquifer is not homogeneous and a preferential flow direction exists in a

northwest to southeast direction. The largest drawdowns in observation wells occurred in RCRA-2 (0.52 feet) and MW-5 (0.72 feet).

Finally, water level monitoring at the Palmer Water Company's Acid Plant Well, which is a deep bedrock well, showed no influence from pumping in the shallow aquifer at RCRA-4.

Groundwater Quality - Groundwater samples were collected at approximately six hour intervals during the 72-hour pump test and analyzed for dissolved cadmium, copper, lead, manganese, and zinc. All parameters measured, with the exception of copper, exceeded safe drinking water standards as set by EPA. Manganese values ranged from 108 to 120 mg/l (EPA's standard for drinking water for manganese is 0.05 mg/l - 40 CFR Part 143.3). Zinc concentrations ranged from 880 to 1,000 mg/l (EPA Standard for drinking water for zinc is 5 mg/l - 40 CFR Part 143.3). Cadmium concentrations ranged from 2.10 to 2.48 mg/l (EPA Standard for cadmium in drinking water is 0.010 mg/l - 40 CFR Part 141.11). Finally, lead concentrations ranged from 0.03 to 0.24 mg/l (EPA Standard for lead in drinking water is 0.05 mg/l - 40 CFR Part 141.11). Based on preliminary data, groundwater quality in the vicinity of the surface impoundments appears to have been impacted by leakage from the impoundments. Additional data will be evaluated in accordance with 25 PA Code 75.265(n).

CONCLUSIONS

1. A dual aquifer system, consisting of an upper unconsolidated aquifer and deep bedrock aquifer, underlies the NJZ Surface Impoundment Management Area.

2. Groundwater in the shallow, unconsolidated aquifer flows from the south-southeast to the north-northwest.

3. A downward vertical flow component exists in the unconsolidated aquifer underlying the surface impoundments.

4. The average transmissivity value and storage coefficient for the shallow unconsolidated aquifer are 24,000 gpd/ft and .000227 respectively.

5. Preliminary data suggests that the NJZ surface impoundments appear to have impacted groundwater quality in the Surface Impoundment Management Area.

6. Pumping at RCRA-4 influenced groundwater in a 600,000 sq. ft. area in the vicinity of the NJZ surface impoundments.

TABLE 1

COMPARISON OF FIRST QUARTER DATA
New Jersey Zinc, Palmerton Smelter

Parameter	Units	Trip Blank	Field Blank	MW-5	RCRA-1	RCRA-2	RCRA-3
Arsenic	mg/l	Ø.Ø34	Ø.Ø31	Ø.Ø57	Ø.Ø57	Ø.Ø64	Ø.Ø54
Mercury	mg/l	N.D.	Ø.ØØØ6	N.D.	N.D.	N.D.	N.D.
Selenium	mg/l	N.D.	N.D.	Ø.Ø25	Ø.Ø13	Ø.Ø14	Ø.Ø23
Barium	mg/l	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Cadmium	mg/l	N.D.	N.D.	Ø.39	2.23	2.35	N.D.
Chromium	mg/l	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Iron	mg/l	N.D.	N.D.	Ø.11	Ø.11	N.D.	N.D.
Lead	mg/l	N.D.	N.D.	N.D.	Ø.14	Ø.14	N.D.
Manganese	mg/l	N.D.	N.D.	61.5	136	134	N.D.
Silver	mg/l	N.D.	N.D.	N.D.	N.D.	N.D	N.D.
Sodium	mg/l	Ø.13	Ø.21	168	136	2Ø4	97.4
Zinc	mg/l	N.D.	Ø.Ø3	263	919	1130	Ø.1Ø
Phenol	mg/l	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Coliform	col/1ØØml	--	--	Ø	Ø	Ø	Ø
Turbidity	N.T.U.	N.D.	1.2	Ø.14	1.1	Ø.37	1.6
Chloride	mg/l	N.D.	N.D.	5.2Ø	12.Ø	1Ø.4	52.Ø
Sulfate	mg/l	N.D.	N.D.	145Ø	375Ø	36ØØ	385
Nitrate(N)	mg/l	N.D.	7.4	8.4	11.Ø	14.Ø	4.Ø
Fluoride	mg/l	N.D.	N.D.	Ø.Ø1Ø	Ø.Ø29	Ø.Ø88	1.75
Gross Alpha	pCi/l	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Gross Beta	pCi/l	N.D.	N.D.	21 ±4	22 ±4	3Ø ±4	15 ±3
Radium	pCi/l	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Lindane	ug/l	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Endrin	ug/l	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Methoxychlor	ug/l	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Toxophene	ug/l	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2,4-D	ug/l	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2,4,5-TP Silvex	ug/l	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Copper	mg/l	--	--	Ø.Ø6	--	--	--
TOC	mg/l	Ø.34	Ø.57	Ø.76	Ø.97	1.Ø	1.1
TOC	mg/l	--	--	Ø.86	--	--	--
TOC	mg/l	--	--	Ø.75	--	--	--
TOC	mg/l	--	--	Ø.73	--	--	--
TOX	ppb	7	9	18	N.D.	9	17
TOX	ppb	--	--	12	--	--	--
TOX	ppb	--	--	N.D.	--	--	--
TOX	ppb	--	--	N.D.	--	--	--
pH	S.PH.U.	--	--	4.6Ø	4.79	5.42	7.92
pH	S.PH.U.	--	--	4.51	--	--	--
pH	S.PH.U.	--	--	4.59	--	--	--
pH	S.PH.U.	--	--	4.56	--	--	--
S.C.	umhos	--	--	149Ø	249Ø	253Ø	1ØØØ
S.C.	umhos	--	--	149Ø	--	--	--
S.C.	umhos	--	--	15ØØ	--	--	--
S.C.	umhos	--	--	15ØØ	--	--	--

N.D. - Not Detected

Addendum

During the course of preparing this report, laboratory results for the first quarter RCRA well samplings were completed by Wright Lab Services, Inc. Table 1 compares results for wells sampled, as well as trip and field blanks taken during this event. Cadmium, manganese, and zinc are present in levels that exceed drinking water criteria as set by the Environmental Protection Agency (cadmium: 0.01 mg/l; manganese: 0.05 mg/l; zinc: 5 mg/l). A comparison of Well MW-5 (upgradient well) to RCRA Wells 1 and 2 (downgradient wells) shows that while MW-5 exceeds EPA criteria, there is a decrease in water quality in the downgradient wells.

Arsenic levels are probably not as high as they appear. The trip blank for arsenic shows a concentration of 0.034 mg/l. This indicates either a sample bottle contamination problem or a contamination problem in the laboratory analytical procedure. If no arsenic concentrations had been present in the field and trip blanks collected on the day of sampling, the problem would be strictly site based.

High nitrate levels are believed to be caused, at least in part, by the field cleaning procedure used for the pressure barrel filter. This procedure includes as one of its steps a rinsing of the barrel filter with a 20 percent nitric acid rinse. Even though several subsequent rinses with distilled/deionized water were carried out, residual nitrate contamination appears to have remained in the barrel filter, as evidenced by the field blank value for nitrates of 7.4 mg/l. Future nitrate samples will be collected in a separate sample bottle and filtered by the laboratory.

High sulfate levels are a site problem, as both the trip and field blanks for this constituent exhibit no detectable sulfate concentrations.

CONDENSED GROUNDWATER SAMPLING AND ANALYTIC PROTOCOL

The required first year RCRA groundwater monitoring program for New Jersey Zinc's East Plant facility was initiated August 21, 1986. RCRA Wells 1, 2, and 3, and Well MW-5 were sampled for the first quarter sampling period. This sampling also covered the first month of an initial six-month background sampling. Additional sampling dates are listed below:

September 17, 1986	- Background Sampling
October 20, 1986	- Quarterly/Background Sampling
November 20, 1986	- Background Sampling
December 18, 1986	- Background Sampling
January 26, 1987	- Quarterly/Background Sampling
April 27, 1987	- Quarterly Sampling

All sampling procedures meet requirements as set forth by Pennsylvania Code Title 25, Section 75.265(n).

Quarterly sampling procedures (four events) of Wells RCRA-1, RCRA-2, RCRA-3, and MW-5 include the following:

1. Measure static water levels in all wells and acquire all necessary sampling using dedicated sampling equipment which was previously installed in each well.

2. Measurement of the following water quality parameters which include:

- Groundwater Quality Parameters

Chloride	Phenolics
Iron	Sodium
Manganese	Sulfate

- Groundwater Contamination Indicator Parameters

pH and Specific Conductance (measured by REWAI in the field at the well head)

Total Organic Halogens (TOX)

Total Organic Carbon (TOC)

(Note: Indicator parameters will be analyzed in quadruplicate only for Well MW-5 during the first year of monitoring.)

- Primary Drinking Water Standards

Arsenic	Nitrate (as N)	Toxaphene
Barium	Selenium	2,4-D
Cadmium	Silver	2,4,5-TP (Silvex)
Chromium	Turbidity	Radium
Fluoride	Endrin	Gross Alpha
Lead	Lindane	Gross Beta
Mercury	Methoxychlor	Coliform Bacteria

- Special Site-Specific Parameters

  Zinc

3. An initial six-month background sampling of Wells RCRA-1, RCRA-2, RCRA-3, and MW-5 is being performed which includes:

   - Measurement of static water levels in all wells and acquisition of all necessary samples using dedicated sampling equipment previously installed in each well. The following analytical parameters are included:

     Cadmium
     Lead
     Zinc

4. Finally, REWAI is providing reports to NJZ as follows:

   - REWAI conducts all statistical analyses required under RCRA for those indicator parameters analyzed in quadruplicate, completes DER reporting form ER-SWM-33, and submits completed forms to Mr. John Griffin, NJZ Palmerton, quarterly, for review and ultimate submittal to DER and EPA.

   - REWAI submits to NJZ copies of all field and laboratory data sheets for all wells sampled, for all sampling events. Data sheets are submitted to Mr. John Griffin monthly for the first six months and then quarterly thereafter.

SAMPLE SHIPMENT

Primary laboratory analyses will be completed by Wright Lab Services, Inc. (WLSI), except for samples being analyzed for TOC, TOX and radionuclides. Samples to be analyzed for these parameters will be shipped by WLSI to authorized subcontracted laboratories. Insulated cartons and cold packs to maintain the temperature (4°C) are required for the preservation of samples sent to the subcontracted laboratories. These cartons will be tagged with tamper proof seals to meet chain-of-custody requirements for shipments of bulk samples by common carrier.

CHAIN-OF-CUSTODY

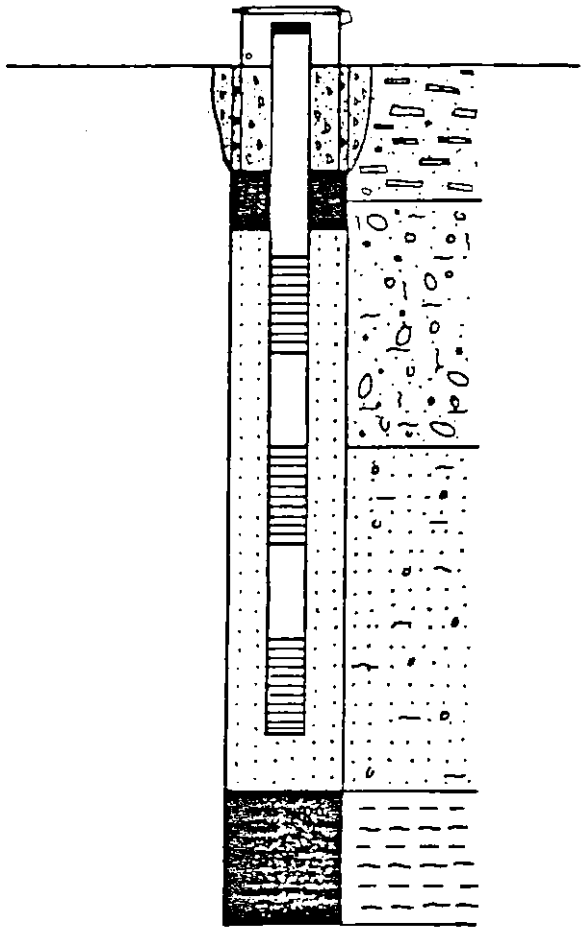
Sample identification numbers and plant name will be recorded on a label affixed to each sample (Figure 1). Sample transfer will be accomplished in groups using a group sample chain-of-custody record as described by Figure 2. When a portion of the samples identified on the record form is to be transferred, the individual samples will be noted along with the signature of the person relinquishing them. Field personnel taking samples are responsible for packaging and dispatching samples, properly filling out, dating, and signing the chain-of-custody recorded form. Since bulk transfer of groups of samples will be used, all cartons will be accompanied by a copy of the chain-of-custody record showing identification of the contents (Figure 2).

Chain-of-custody procedures are also necessary in all laboratories at the time of sample receipt. The laboratory sample custodian will maintain a permanent log book in which he will record, for each sample, date and time received, source of sample, sample number, and how the samples were transmitted to the laboratory. In bulk transfer of groups of samples, the

APPENDIX I

Geologic and Well Construction Logs

Monitoring Well #5
8520-2



Black cinders and fill. Dry. Many clinkers present.

Medium brown, slightly clayey, silty, sandy gravel. Gravel is fine to coarse, siltstone, sandstone and quartzite. Some chert. Subround to round. Sand is medium to coarse-grained. Many cobbles and boulders present. Outwash.

Medium brown to red-brown, silty, gravelly sand. Sand is fine to coarse-grained. Some areas have many cobbles. Gravel ranges from fine to coarse.

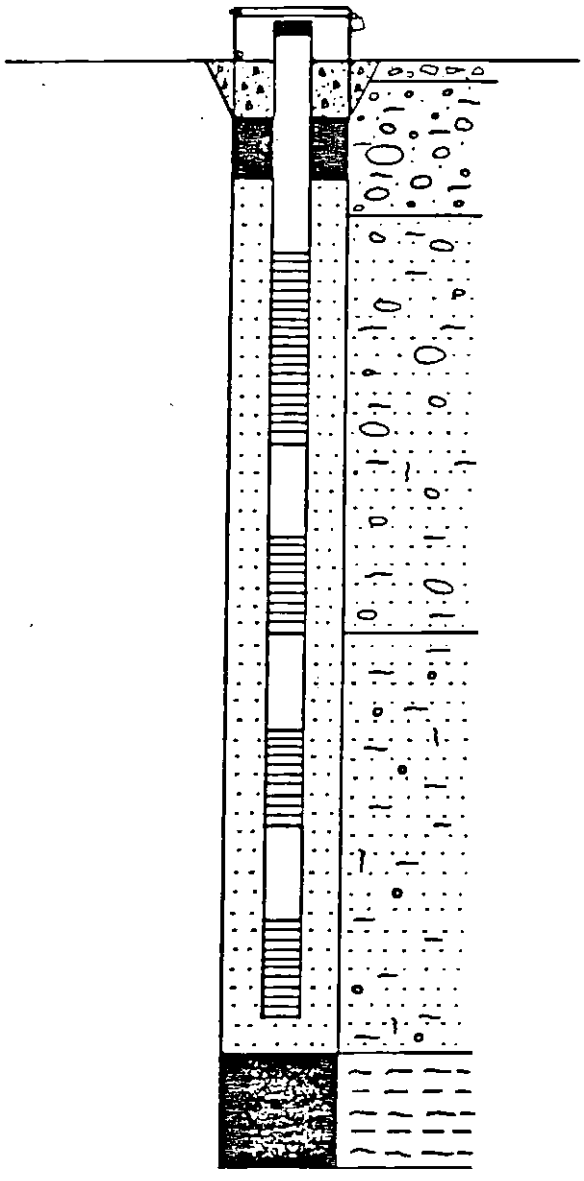
Red-brown shale and siltstone of the Bloomsburg Formation. Traces of fine-grained sandstone also. Upper interval appears highly weathered.

Well No. MW-5
Total Depth: 45'
Depth to Bedrock: 38'
Hole Diameter: 8"
Monitoring Tube: 2" PVC
Screened Interval: 9' to 38'
Sampling Method: Well Wizard

Elevation TOC: 426.33
Elevation GS: 423.83
SWL (Date): 410.41 (8/21/86)
Geologist: JST/FJF
Driller: Eichelberger Well Drilling
Drilling Began: 4/1/86
Drilling Completed: 4/2/86

RCRA Monitoring Well #1
8520-2

NJZ/PALMERTON
RCRA-1



Black cinders and fill. Some slag.

Gray-brown to brown, silty, sandy gravel. Poorly sorted. Many large cobbles. Some boulders. Sand is mostly medium to coarse-grained. Gravel is fine to very coarse. Outwash.

Gray-brown to medium brown, silty, gravelly sand. Sand is mostly medium to coarse-grained. Gravel is fine to very coarse. Some chert present. Better sorted than above. Trace clay. Outwash. Saturated.

Medium brown to orange-brown, slightly clayey, silty, fine to medium-grained sand. Some coarse sand and gravel still present. Very dense in spots. Fair sorting. Saturated. Many red-brown shale chips around 51'.

(Estimated 20 gpm yield)

Red-brown shale and siltstone of the Bloomsburg Formation. Trace of gray-green shale. Small amounts of fine to medium-grained sandstone also present.

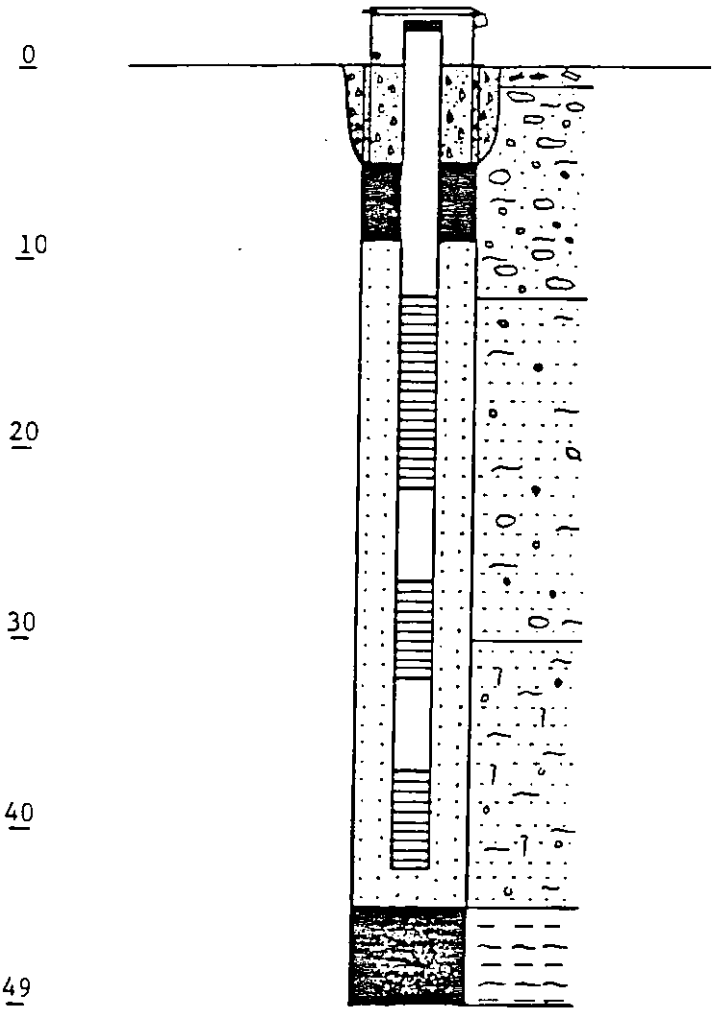
Well No.: RCRA-1
Total Depth: 58'
Depth to Bedrock: 52'
Hole Diameter: 6"
Monitoring Tube: 2" PVC
Screened Interval: 6.5' to 52'
Sampling Method: Well Wizard

Elevation TOC: 415.80
Elevation GS: 413.80
SWL (Date): 407.63 (8/21/86)
Geologist: JST
Driller: Eichelberger Well Drilling
Drilling Began: 4/4/86
Drilling Completed: 4/7/86

r.e. wright associates, inc.

RCRA Monitoring Well #2
8520-2

NJZ/PALMERTON
RCRA-2



Black cinders and fill. Some slag. Dry.

Gray-brown to brown, silty, sandy gravel. Many large cobbles encountered. Gravel is fine to coarse. Sand ranges from medium to very coarse. Poorly sorted. Some chert. Outwash.

Grayish-brown to brown, silty, gravelly sand. Sand is mostly coarse to very coarse-grained. Gravel is mostly fine. A few larger cobbles encountered. Sand and gravel fine downward. Better sorted than above. Outwash.

Grayish-brown, clayey, silty, very fine to medium-grained sand. Some gravel present in spots. Fair sorting. Saturated. Some red-brown shale chips near 42'. Dense.

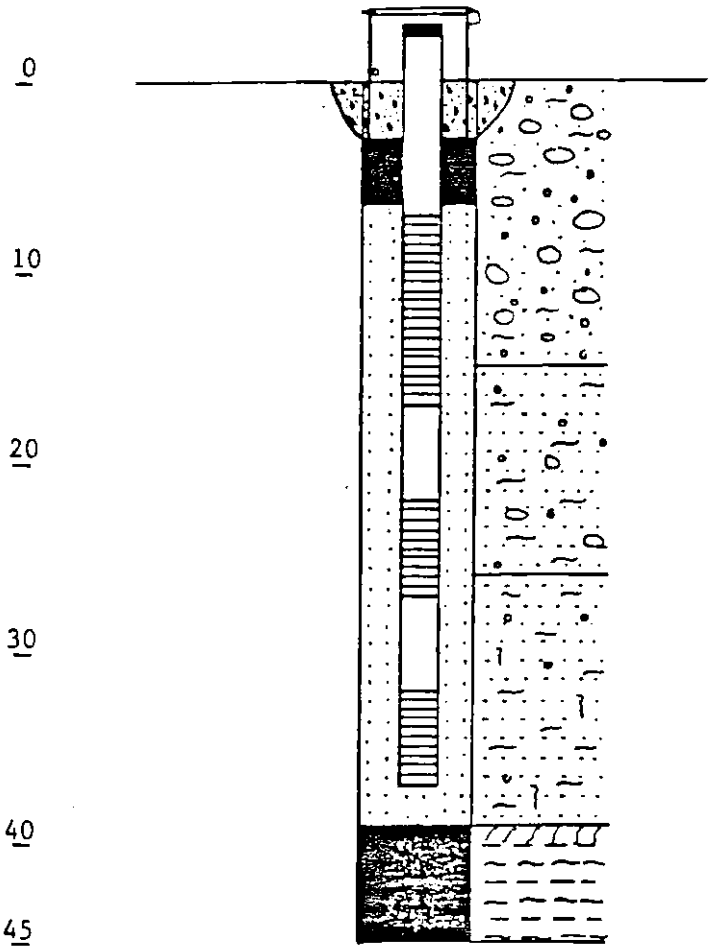
Dusky red to reddish-brown shale and siltstone. Traces of grayish-green shale. Shale is somewhat silty. Shale and siltstone encountered is Bloomsburg Formation.

Well No.: RCRA-2
Total Depth: 49'
Depth to Bedrock: 44'
Hole Diameter: 6"
Monitoring Tube: 2" PVC
Screened Interval: 9' to 44'
Sampling Method: Well Wizard

Elevation TOC: 416.68
Elevation GS: 413.60
SWL (Date): 408.64 (8/21/86)
Geologist: FJF
Driller: Eichelberger Well Drilling
Drilling Began: 4/8/86
Drilling Completed: 4/8/86

RCRA Monitoring Well #3
8520-2

NJZ/PALMERTON
RCRA-3



Gray-brown to medium brown, silty, sandy gravel. Many large cobbles also present. Gravel is fine to coarse, well-rounded sandstone, siltstone and shale. Trace chert. Sand is primarily medium to coarse-grained. Poorly sorted. Trace clay. Outwash.

Gray-brown, silty, gravelly, fine to coarse sand. Trace cobbles. Better sorted than above. Gravel is fine to coarse. This material fines downward. Trace clay. Outwash.

Orange-brown to medium brown, silty, fine to medium-grained sand. Some clay present. Trace gravel. Fair sorting. Loose. Saturated. Water present.

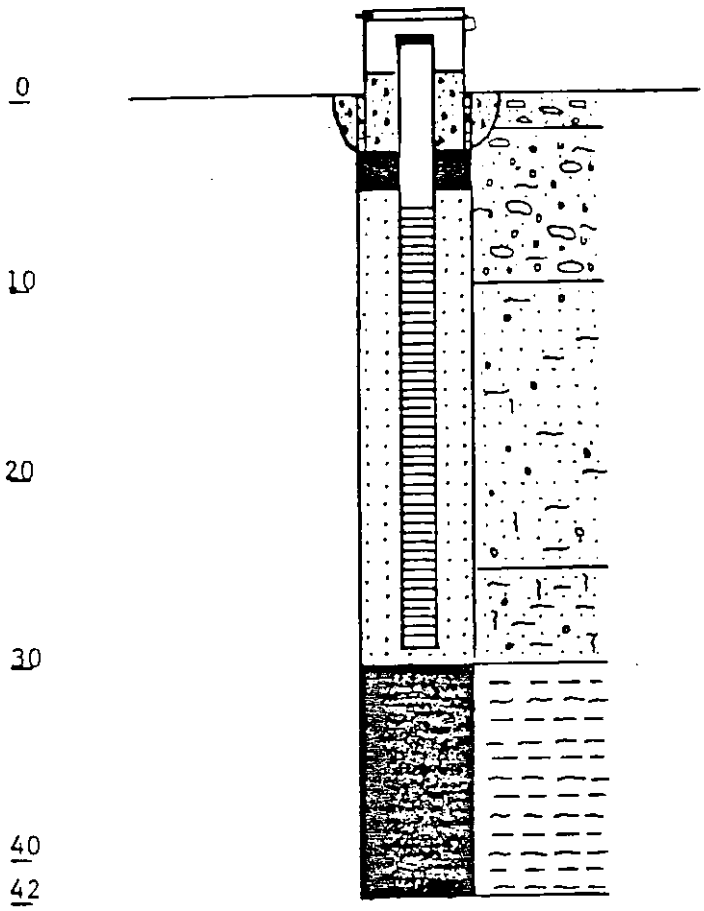
Dusky red, red-brown and gray-green shale, silstone and mudstone. Upper 1' is highly weathered. Platy. Fissile. Very soft. Weathered zone from 42' to 43', possible WBZ. Becoming harder at 44'.

Well No.: RCRA-3
Total Depth: 45'
Depth to Bedrock: 39'
Hole Diameter: 6"
Monitoring Tube: 2" PVC
Screened Interval: 6.5' to 39'
Sampling Method: Well Wizard

Elevation TOC: 417.24
Elevation GS: 414.04
SWL (Date): 408.24 (8/21/86)
Geologist: JST
Driller: Eichelberger Well Drilling
Drilling Began: 4/8/86
Drilling Completed: 4/9/86

RCRA Monitoring Well #4
8520-2

NJZ/PALMERTON
RCRA-4



Dark brown fill consisting of gravel mixed with cinders. Dry.

Gray-brown to medium brown, slightly silty, sandy, gravel. Many large cobbles present. Trace clay. Loose. Poorly sorted. Sand is fine to coarse-grained. Gravel is also fine to coarse. Outwash.

Gray-brown to medium brown, silty, gravelly sand. Sand is fine to coarse-grained. Trace clay. A little better sorted. Becoming a little coarser towards 20'. Loose. Outwash.

Orange-brown, slightly clayey, silty sand with some fine gravel. Cohesive. Stiff. Sand is fine to medium-grained. Some coarse sand.

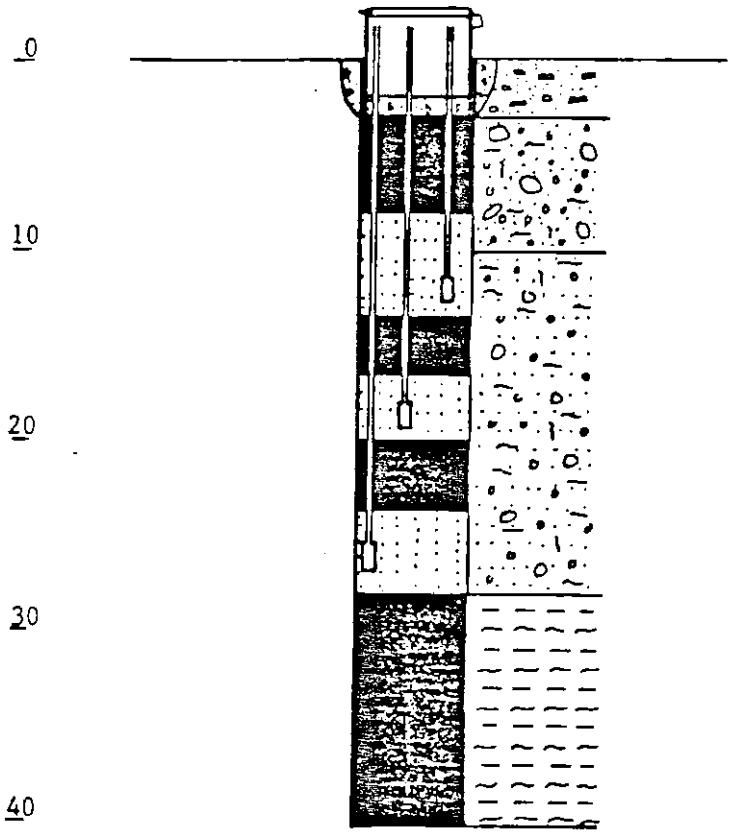
Red-brown to gray-green shale and siltstone of the Bloomsburg Formation. Weathered brown in spots. Fairly hard. Shale is platy while siltstone is blocky. Trace sandstone.

Well No.: RCRA-4
Total Depth: 42'
Depth to Bedrock: 30'
Hole Diameter: 10"
Monitoring Tube: 6" PVC
Screened Interval: 5' to 30'
Sampling Method: Submersible Pump

Elevation TOC: 419.53
Elevation GS: 415.20
SWL (Date): 409.93 (8/21/86)
Geologist: JST
Driller: Eichelberger Well Drilling
Drilling Began: 5/2/86
Drilling Completed: 5/5/86

RCRA Monitoring Well #5
8520-2

NJZ/PALMERTON
RCRA-5 (GEOMONS)



Dark black sandy fill with cinders and slag.

Gray-brown to medium brown, silty, sandy gravel. Many large cobbles present. Gravel is fine to coarse. Sand is mostly medium to very coarse. Poorly sorted. Trace clay. Outwash.

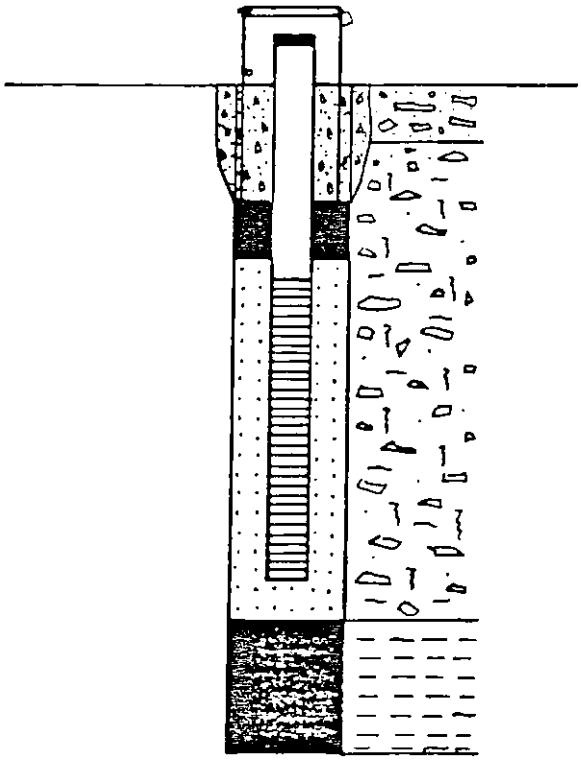
Gray-brown to medium brown, silty, gravelly sand. Sand is fine to coarse-grained. Gravel is finer overall but intervals of coarse gravel occur to rock. Poor to fair sorting. Some clay in spots. Dense. Outwash.

Dusky red to red-brown shale and siltstone with interbedded gray-green shale. Shale is slightly silty. Highly weathered from 30 to 30.5'. Weathered at 39' with a small clay seam.

Well No.: RCRA-5
Total Depth: 40'
Depth to Bedrock: 28'
Hole Diameter: 6"
Monitoring Tube: Geomon (3/4" PVC)
Shallow Geomon: 12.5'
Middle Geomon: 19.0'
Deep Geomon: 26.5'
Sampling Method: Geomon

Elevation Toc: 420.97
Elevation GS: 418.47
SWL (Date): Shallow - 410.39'
Middle - 409.97'
Deep - 409.18'
Geologist: JST
Driller: Eichelberger Well Drilling
Drilling Began: 4/11/86
Drilling Completed: 4/14/86

RCRA Monitoring Well #6
8520-2



Black cinders and slag. Fill. Dry.

Red-brown, silty, clayey sandstone and shale gravel colluvium. Gravel is fine to coarse, subangular to angular. Poorly sorted. Parent material is primarily Bloomsburg Formation.

Dusky red to red-brown shale. Shale is somewhat silty. Trace of siltstone. Shale is part of the Bloomsburg Formation.

Well No.: RCRA-6
Total Depth: 35'
Depth to Bedrock: 28'
Hole Diamter: 6"
Monitoring Tube: 2" PVC
Screened Interval: 9' to 28'
Sampling Method: Well Wizard

Elevation TOC: 430.90
Elevation GS: 427.57
SWL (Date): 405.17 (8/20/86)
Geologist: FJF
Driller: Eichelberger Well Drilling
Drilling Began: 6/13/86
Drilling Completed: 6/13/86

APPENDIX II

Groundwater Chemistry Results for Dissolved Cd, Cu, Pb, Mn, and Zn Collected at RCRA Well-4 During the 72-Hour Pumping Test

• WATER/WASTEWATER
• SOILS/SOLIDS
• AIR/GASES

Wright Lab Services, Inc.

• ATOMIC ABSORPTION
• GAS CHROMATOGRAPHY
• WET CHEMISTRY

June 23, 1986

Mr. Eric J. Slavin
R. E. Wright Associates, Inc.
3240 Schoolhouse Road
Middletown, PA 17057

LAB ANALYSIS REPORT

PROJ. NAME:	NJZ/Palmerton	DATE SAMPLED:	05/26/86
PROJ. ID. NO.:	8520-2	DATE RECEIVED:	05/30/86
SAMPLE CODE:	Trip Blank	DATE COMPLETED:	06/19/86
SAMPLE DESC.:	Water	SAMPLE COLLECTOR:	RB/JL/DS
LAB SAMPLE NO.:	W-9981	SAMPLE DISCARD DATE:	07/19/86

METALS FLAME ANALYSIS
Dissolved

PARAMETER	DETECTION LIMIT	RESULT	UNITS
Cadmium	< 0.005	N.D.	mg/l
Copper	< 0.02	N.D.	mg/l
Manganese	< 0.02	N.D.	mg/l
Zinc		0.04	mg/l

METALS FLAMELESS ANALYSIS
Dissolved

PARAMETER	DETECTION LIMIT	RESULT	UNITS
Lead	< 0.005	N.D.	mg/l

N.D.-Not Detected

Respectfully submitted,

WRIGHT LAB SERVICES, INC.

Ian M. Milnes
Laboratory Manager

IMM:kaa

• WATER/WASTEWATER
• SOILS/SOLIDS
• AIR/GASES

Wright Lab Services, Inc.

• ATOMIC ABSORPTION
• GAS CHROMATOGRAPHY
• WET CHEMISTRY

June 23, 1986

Mr. Eric J. Slavin
R. E. Wright Associates, Inc.
3240 Schoolhouse Road
Middletown, PA 17057

LAB ANALYSIS REPORT

PROJ. NAME:	NJZ/Palmerton	DATE SAMPLED:	05/27/86
PROJ. ID. NO.:	8520-2	DATE RECEIVED:	05/30/86
SAMPLE CODE:	Field Blank	DATE COMPLETED:	06/19/86
SAMPLE DESC.:	Water	SAMPLE COLLECTOR:	RB/JL/DS
LAB SAMPLE NO.:	W-9978	SAMPLE DISCARD DATE:	07/19/86

METALS FLAME ANALYSIS
Dissolved

PARAMETER	DETECTION LIMIT	RESULT	UNITS
Cadmium	< 0.005	N.D.	mg/l
Copper	< 0.02	N.D.	mg/l
Manganese	< 0.02	N.D.	mg/l
Zinc		0.04	mg/l

METALS FLAMELESS ANALYSIS
Dissolved

PARAMETER	DETECTION LIMIT	RESULT	UNITS
Lead		0.005	mg/l

N.D.-Not Detected

Respectfully submitted,

WRIGHT LAB SERVICES, INC.

Ian M. Milnes
Laboratory Manager

IMM:kaa

• WATER·WASTEWATER
• SOILS·SOLIDS
• AIR·GASES

Wright Lab Services, Inc.

• ATOMIC ABSORPTION
• GAS CHROMATOGRAPHY
• WET CHEMISTRY

June 23, 1986

Mr. Eric J. Slavin
R. E. Wright Associates, Inc.
3240 Schoolhouse Road
Middletown, PA 17057

LAB ANALYSIS REPORT

PROJ. NAME:	NJZ/Palmerton	DATE SAMPLED:	05/27/86
PROJ. ID. NO.:	8520-2	DATE RECEIVED:	05/30/86
SAMPLE CODE:	RCRA-4	DATE COMPLETED:	06/20/86
SAMPLE DESC.:	Time: 14:20	SAMPLE COLLECTOR:	RB/JL/DS
LAB SAMPLE NO.:	W-9964	SAMPLE DISCARD DATE:	07/20/86

METALS FLAME ANALYSIS
Dissolved

PARAMETER	DETECTION LIMIT	RESULT	UNITS
Cadmium		2.10	mg/l
Copper		0.13	mg/l
Manganese		108	mg/l
Zinc		880	mg/l

METALS FLAMELESS ANALYSIS
Dissolved

PARAMETER	DETECTION LIMIT	RESULT	UNITS
Lead		0.03	mg/l

N.D.-Not Detected

Respectfully submitted,

WRIGHT LAB SERVICES, INC.

Ian M. Milnes
Laboratory Manager

IMM:kaa

• WATER/WASTEWATER
• SOILS/SOLIDS
• AIR/GASES

Wright Lab Services, Inc.

• ATOMIC ABSORPTION
• GAS CHROMATOGRAPHY
• WET CHEMISTRY

June 23, 1986

Mr. Eric J. Slavin
R. E. Wright Associates, Inc.
3240 Schoolhouse Road
Middletown, PA 17057

LAB ANALYSIS REPORT

PROJ. NAME:	NJZ/Palmerton	DATE SAMPLED:	05/27/86
PROJ. ID. NO.:	8520-2	DATE RECEIVED:	05/30/86
SAMPLE CODE:	RCRA-4	DATE COMPLETED:	06/20/86
SAMPLE DESC.:	Time: 20:35	SAMPLE COLLECTOR:	RB/JL/DS
LAB SAMPLE NO.:	W-9965	SAMPLE DISCARD DATE:	07/20/86

METALS FLAME ANALYSIS
Dissolved

PARAMETER	DETECTION LIMIT	RESULT	UNITS
Cadmium		2.30	mg/l
Copper		0.12	mg/l
Manganese		112	mg/l
Zinc		920	mg/l

METALS FLAMELESS ANALYSIS
Dissolved

PARAMETER	DETECTION LIMIT	RESULT	UNITS
Lead		0.14	mg/l

N.D.-Not Detected

Respectfully submitted,

WRIGHT LAB SERVICES, INC.

Ian M. Milnes
Laboratory Manager

IMM:kaa

• WATER/WASTEWATER
• SOILS/SOLIDS
• AIR/GASES

Wright Lab Services, Inc.

• ATOMIC ABSORPTION
• GAS CHROMATOGRAPHY
• WET CHEMISTRY

June 23, 1986

Mr. Eric J. Slavin
R. E. Wright Associates, Inc.
3240 Schoolhouse Road
Middletown, PA 17057

LAB ANALYSIS REPORT

PROJ. NAME:	NJZ/Palmerton	DATE SAMPLED:	05/28/86
PROJ. ID. NO.:	8520-2	DATE RECEIVED:	05/30/86
SAMPLE CODE:	RCRA-4	DATE COMPLETED:	06/20/86
SAMPLE DESC.:	Time: 21:10	SAMPLE COLLECTOR:	RB/JL/DS
LAB SAMPLE NO.:	W-9970	SAMPLE DISCARD DATE:	07/20/86

METALS FLAME ANALYSIS
Dissolved

PARAMETER	DETECTION LIMIT	RESULT	UNITS
Cadmium		2.44	mg/l
Copper		0.13	mg/l
Manganese		119	mg/l
Zinc		1000	mg/l

METALS FLAMELESS ANALYSIS
Dissolved

PARAMETER	DETECTION LIMIT	RESULT	UNITS
Lead		0.24	mg/l

N.D.-Not Detected

Respectfully submitted,

WRIGHT LAB SERVICES, INC.

Ian M. Milnes
Laboratory Manager

IMM:kaa

• WATER/WASTEWATER
• SOILS/SOLIDS
• AIR/GASES

Wright Lab Services, Inc.

• ATOMIC ABSORPTION
• GAS CHROMATOGRAPHY
• WET CHEMISTRY

June 23, 1986

Mr. Eric J. Slavin
R. E. Wright Associates, Inc.
3240 Schoolhouse Road
Middletown, PA 17057

LAB ANALYSIS REPORT

PROJ. NAME:	NJZ/Palmerton	DATE SAMPLED:	05/29/86
PROJ. ID. NO.:	8520-2	DATE RECEIVED:	05/30/86
SAMPLE CODE:	RCRA-4	DATE COMPLETED:	06/20/86
SAMPLE DESC.:	Time: 03:10	SAMPLE COLLECTOR:	RB/JL/DS
LAB SAMPLE NO.:	W-9971	SAMPLE DISCARD DATE:	07/20/86

METALS FLAME ANALYSIS
Dissolved

PARAMETER	DETECTION LIMIT	RESULT	UNITS
Cadmium		2.40	mg/l
Copper		0.15	mg/l
Manganese		117	mg/l
Zinc		980	mg/l

METALS FLAMELESS ANALYSIS
Dissolved

PARAMETER	DETECTION LIMIT	RESULT	UNITS
Lead		0.09	mg/l

N.D.-Not Detected

Respectfully submitted,

WRIGHT LAB SERVICES, INC.

Ian M. Milnes

Ian M. Milnes
Laboratory Manager

IMM:kaa

- WATER/WASTEWATER
- SOILS/SOLIDS
- AIR GASES

Wright Lab Services, Inc.

- ATOMIC ABSORPTION
- GAS CHROMATOGRAPHY
- WET CHEMISTRY

June 23, 1986

Mr. Eric J. Slavin
R. E. Wright Associates, Inc.
3240 Schoolhouse Road
Middletown, PA 17057

LAB ANALYSIS REPORT

PROJ. NAME:	NJZ/Palmerton	DATE SAMPLED:	05/29/86
PROJ. ID. NO.:	8520-2	DATE RECEIVED:	05/30/86
SAMPLE CODE:	RCRA-4	DATE COMPLETED:	06/20/86
SAMPLE DESC.:	Time: 09:10	SAMPLE COLLECTOR:	RB/JL/DS
LAB SAMPLE NO.:	W-9972	SAMPLE DISCARD DATE:	07/20/86

METALS FLAME ANALYSIS
Dissolved

PARAMETER	DETECTION LIMIT	RESULT	UNITS
Cadmium		2.36	mg/l
Copper		0.12	mg/l
Manganese		116	mg/l
Zinc		940	mg/l

METALS FLAMELESS ANALYSIS
Dissolved

PARAMETER	DETECTION LIMIT	RESULT	UNITS
Lead		0.06	mg/l

N.D.-Not Detected

Respectfully submitted,

WRIGHT LAB SERVICES, INC.

Ian M. Milnes

Ian M. Milnes
Laboratory Manager

IMM:kaa

• WATER/WASTEWATER
• SOILS/SOLIDS
• AIR/GASES

Wright Lab Services, Inc.

• ATOMIC ABSORPTION
• GAS CHROMATOGRAPHY
• WET CHEMISTRY

June 23, 1986

Mr. Eric J. Slavin
R. E. Wright Associates, Inc.
3240 Schoolhouse Road
Middletown, PA 17057

LAB ANALYSIS REPORT

PROJ. NAME:	NJZ/Palmerton	DATE SAMPLED:	05/29/86
PROJ. ID. NO.:	8520-2	DATE RECEIVED:	05/30/86
SAMPLE CODE:	RCRA-4	DATE COMPLETED:	06/20/86
SAMPLE DESC.:	Time: 15:20	SAMPLE COLLECTOR:	RB/JL/DS
LAB SAMPLE NO.:	W-9973	SAMPLE DISCARD DATE:	07/20/86

METALS FLAME ANALYSIS
Dissolved

PARAMETER	DETECTION LIMIT	RESULT	UNITS
Cadmium		2.36	mg/l
Copper		0.13	mg/l
Manganese		116	mg/l
Zinc		940	mg/l

METALS FLAMELESS ANALYSIS
Dissolved

PARAMETER	DETECTION LIMIT	RESULT	UNITS
Lead		0.13	mg/l

N.D.-Not Detected

Respectfully submitted,

WRIGHT LAB SERVICES, INC.

Ian M. Milnes
Laboratory Manager

IMM:kaa

• WATER/WASTEWATER
• SOILS/SOLIDS
• AIR/GASES

Wright Lab Services, Inc.

• ATOMIC ABSORPTION
• GAS CHROMATOGRAPHY
• WET CHEMISTRY

June 23, 1986

Mr. Eric J. Slavin
R. E. Wright Associates, Inc.
3240 Schoolhouse Road
Middletown, PA 17057

LAB ANALYSIS REPORT

PROJ. NAME:	NJZ/Palmerton	DATE SAMPLED:	05/29/86
PROJ. ID. NO.:	8520-2	DATE RECEIVED:	05/30/86
SAMPLE CODE:	RCRA-4	DATE COMPLETED:	06/20/86
SAMPLE DESC.:	Time: 21:30	SAMPLE COLLECTOR:	RB/JL/DS
LAB SAMPLE NO.:	W-9974	SAMPLE DISCARD DATE:	07/20/86

METALS FLAME ANALYSIS
Dissolved

PARAMETER	DETECTION LIMIT	RESULT	UNITS
Cadmium		2.30	mg/l
Copper		0.12	mg/l
Manganese		114	mg/l
Zinc		920	mg/l

METALS FLAMELESS ANALYSIS
Dissolved

PARAMETER	DETECTION LIMIT	RESULT	UNITS
Lead		0.06	mg/l

N.D.-Not Detected

Respectfully submitted,

WRIGHT LAB SERVICES, INC.

Ian M. Milnes
Laboratory Manager

IMM:kaa

• WATER/WASTEWATER
• SOILS/SOLIDS
• AIR/GASES

Wright Lab Services, Inc.

• ATOMIC ABSORPTION
• GAS CHROMATOGRAPHY
• WET CHEMISTRY

June 23, 1986

Mr. Eric J. Slavin
R. E. Wright Associates, Inc.
3240 Schoolhouse Road
Middletown, PA 17057

LAB ANALYSIS REPORT

PROJ. NAME:	NJZ/Palmerton	DATE SAMPLED:	05/30/86
PROJ. ID. NO.:	8520-2	DATE RECEIVED:	05/30/86
SAMPLE CODE:	RCRA-4	DATE COMPLETED:	06/20/86
SAMPLE DESC.:	Time: 03:10	SAMPLE COLLECTOR:	RB/JL/DS
LAB SAMPLE NO.:	W-9975	SAMPLE DISCARD DATE:	07/20/86

METALS FLAME ANALYSIS
Dissolved

PARAMETER	DETECTION LIMIT	RESULT	UNITS
Cadmium		2.30	mg/l
Copper		0.13	mg/l
Manganese		112	mg/l
Zinc		910	mg/l

METALS FLAMELESS ANALYSIS
Dissolved

PARAMETER	DETECTION LIMIT	RESULT	UNITS
Lead		0.11	mg/l

N.D.-Not Detected

Respectfully submitted,

WRIGHT LAB SERVICES, INC.

Ian M. Milnes
Laboratory Manager

IMM:kaa

• WATER/WASTEWATER
• SOILS/SOLIDS
• AIR/GASES

Wright Lab Services, Inc.

• ATOMIC ABSORPTION
• GAS CHROMATOGRAPHY
• WET CHEMISTRY

June 23, 1986

Mr. Eric J. Slavin
R. E. Wright Associates, Inc.
3240 Schoolhouse Road
Middletown, PA 17057

LAB ANALYSIS REPORT

PROJ. NAME:	NJZ/Palmerton	DATE SAMPLED:	05/30/86
PROJ. ID. NO.:	8520-2	DATE RECEIVED:	05/30/86
SAMPLE CODE:	RCRA-4	DATE COMPLETED:	06/20/86
SAMPLE DESC.:	Time: 09:10	SAMPLE COLLECTOR:	RB/JL/DS
LAB SAMPLE NO.:	W-9976	SAMPLE DISCARD DATE:	07/20/86

METALS FLAME ANALYSIS
Dissolved

PARAMETER	DETECTION LIMIT	RESULT	UNITS
Cadmium		2.22	mg/l
Copper		0.12	mg/l
Manganese		110	mg/l
Zinc		910	mg/l

METALS FLAMELESS ANALYSIS
Dissolved

PARAMETER	DETECTION LIMIT	RESULT	UNITS
Lead		0.05	mg/l

N.D.-Not Detected

Respectfully submitted,

WRIGHT LAB SERVICES, INC.

Ian M. Milnes
Laboratory Manager

IMM:kaa

• WATER/WASTEWATER
• SOILS/SOLIDS
• AIR/GASES

Wright Lab Services, Inc.

• ATOMIC ABSORPTION
• GAS CHROMATOGRAPHY
• WET CHEMISTRY

June 23, 1986

Mr. Eric J. Slavin
R. E. Wright Associates, Inc.
3240 Schoolhouse Road
Middletown, PA 17057

LAB ANALYSIS REPORT

PROJ. NAME:	NJZ/Palmerton	DATE SAMPLED:	05/30/86
PROJ. ID. NO.:	8520-2	DATE RECEIVED:	05/30/86
SAMPLE CODE:	RCRA-4	DATE COMPLETED:	06/20/86
SAMPLE DESC.:	Time: 14:10	SAMPLE COLLECTOR:	RB/JL/DS
LAB SAMPLE NO.:	W-9977	SAMPLE DISCARD DATE:	07/20/86

METALS FLAME ANALYSIS
Dissolved

PARAMETER	DETECTION LIMIT	RESULT	UNITS
Cadmium		2.22	mg/l
Copper		0.13	mg/l
Manganese		110	mg/l
Zinc		890	mg/l

METALS FLAMELESS ANALYSIS
Dissolved

PARAMETER	DETECTION LIMIT	RESULT	UNITS
Lead		0.19	mg/l

N.D.-Not Detected

Respectfully submitted,

WRIGHT LAB SERVICES, INC.

Ian M. Milnes
Laboratory Manager

IMM:kaa

• WATER/WASTEWATER
• SOILS/SOLIDS
• AIR/GASES

Wright Lab Services, Inc.

• ATOMIC ABSORPTION
• GAS CHROMATOGRAPHY
• WET CHEMISTRY

June 23, 1986

Mr. Eric J. Slavin
R. E. Wright Associates, Inc.
3240 Schoolhouse Road
Middletown, PA 17057

LAB ANALYSIS REPORT

PROJ. NAME:	NJZ/Palmerton	DATE SAMPLED:	05/28/86
PROJ. ID. NO.:	8520-2	DATE RECEIVED:	05/30/86
SAMPLE CODE:	Field Blank	DATE COMPLETED:	06/20/86
SAMPLE DESC.:	Water	SAMPLE COLLECTOR:	RB/JL/DS
LAB SAMPLE NO.:	W-9979	SAMPLE DISCARD DATE:	07/20/86

METALS FLAME ANALYSIS
Dissolved

PARAMETER	DETECTION LIMIT	RESULT	UNITS
Cadmium		0.31	mg/l
Copper	< 0.02	N.D.	mg/l
Manganese		14.2	mg/l
Zinc		100	mg/l

METALS FLAMELESS ANALYSIS
Dissolved

PARAMETER	DETECTION LIMIT	RESULT	UNITS
Lead		0.06	mg/l

N.D.-Not Detected

Respectfully submitted,

WRIGHT LAB SERVICES, INC.

Ian M. Milnes
Laboratory Manager

IMM:kaa

• WATER/WASTEWATER
• SOILS/SOLIDS
• AIR/GASES

Wright Lab Services, Inc.

• ATOMIC ABSORPTION
• GAS CHROMATOGRAPHY
• WET CHEMISTRY

June 23, 1986

Mr. Eric J. Slavin
R. E. Wright Associates, Inc.
3240 Schoolhouse Road
Middletown, PA 17057

LAB ANALYSIS REPORT

PROJ. NAME:	NJZ/Palmerton	DATE SAMPLED:	05/29/86
PROJ. ID. NO.:	8520-2	DATE RECEIVED:	05/30/86
SAMPLE CODE:	Field Blank	DATE COMPLETED:	06/20/86
SAMPLE DESC.:	Water	SAMPLE COLLECTOR:	RB/JL/DS
LAB SAMPLE NO.:	W-9980	SAMPLE DISCARD DATE:	07/20/86

METALS FLAME ANALYSIS
Dissolved

PARAMETER	DETECTION LIMIT	RESULT	UNITS
Cadmium	< 0.02	0.31	mg/l
Copper		N.D.	mg/l
Manganese		21.5	mg/l
Zinc		100	mg/l

METALS FLAMELESS ANALYSIS
Dissolved

PARAMETER	DETECTION LIMIT	RESULT	UNITS
Lead		0.10	mg/l

N.D.-Not Detected

Respectfully submitted,

WRIGHT LAB SERVICES, INC.

Ian M. Milnes
Laboratory Manager

IMM:kaa

• WATER/WASTEWATER
• SOILS/SOLIDS
• AIR/GASES

Wright Lab Services, Inc.

• ATOMIC ABSORPTION
• GAS CHROMATOGRAPHY
• WET CHEMISTRY

June 23, 1986

Mr. Eric J. Slavin
R. E. Wright Associates, Inc.
3240 Schoolhouse Road
Middletown, PA 17057

LAB ANALYSIS REPORT

PROJ. NAME:	NJZ/Palmerton	DATE SAMPLED:	05/28/86
PROJ. ID. NO.:	8520-2	DATE RECEIVED:	05/30/86
SAMPLE CODE:	RCRA-4	DATE COMPLETED:	06/20/86
SAMPLE DESC.:	Time: 02:10	SAMPLE COLLECTOR:	RB/JL/DS
LAB SAMPLE NO.:	W-9966	SAMPLE DISCARD DATE:	07/20/86

METALS FLAME ANALYSIS
Dissolved

PARAMETER	DETECTION LIMIT	RESULT	UNITS
Cadmium		2.36	mg/l
Copper		0.12	mg/l
Manganese		116	mg/l
Zinc		980	mg/l

METALS FLAMELESS ANALYSIS
Dissolved

PARAMETER	DETECTION LIMIT	RESULT	UNITS
Lead		0.11	mg/l

N.D.-Not Detected

Respectfully submitted,

WRIGHT LAB SERVICES, INC.

Ian M. Milnes

Ian M. Milnes
Laboratory Manager

IMM:kaa

• WATER/WASTEWATER
• SOILS/SOLIDS
• AIR/GASES

Wright Lab Services, Inc.

• ATOMIC ABSORPTION
• GAS CHROMATOGRAPHY
• WET CHEMISTRY

June 23, 1986

Mr. Eric J. Slavin
R. E. Wright Associates, Inc.
3240 Schoolhouse Road
Middletown, PA 17057

LAB ANALYSIS REPORT

PROJ. NAME:	NJZ/Palmerton	DATE SAMPLED:	05/28/86
PROJ. ID. NO.:	8520-2	DATE RECEIVED:	05/30/86
SAMPLE CODE:	RCRA-4	DATE COMPLETED:	06/20/86
SAMPLE DESC.:	Time: 08:10	SAMPLE COLLECTOR:	RB/JL/DS
LAB SAMPLE NO.:	W-9967	SAMPLE DISCARD DATE:	07/20/86

METALS FLAME ANALYSIS
Dissolved

PARAMETER	DETECTION LIMIT	RESULT	UNITS
Cadmium		2.48	mg/l
Copper		0.12	mg/l
Manganese		118	mg/l
Zinc		980	mg/l

METALS FLAMELESS ANALYSIS
Dissolved

PARAMETER	DETECTION LIMIT	RESULT	UNITS
Lead		0.08	mg/l

N.D.-Not Detected

Respectfully submitted,

WRIGHT LAB SERVICES, INC.

Ian M. Milnes
Laboratory Manager

IMM:kaa

• WATER/WASTEWATER
• SOILS/SOLIDS
• AIR/GASES

Wright Lab Services, Inc.

• ATOMIC ABSORPTION
• GAS CHROMATOGRAPHY
• WET CHEMISTRY

June 23, 1986

Mr. Eric J. Slavin
R. E. Wright Associates, Inc.
3240 Schoolhouse Road
Middletown, PA 17057

LAB ANALYSIS REPORT

PROJ. NAME:	NJZ/Palmerton	DATE SAMPLED:	05/28/86
PROJ. ID. NO.:	8520-2	DATE RECEIVED:	05/30/86
SAMPLE CODE:	RCRA-4	DATE COMPLETED:	06/20/86
SAMPLE DESC.:	Time: 12:10	SAMPLE COLLECTOR:	RB/JL/DS
LAB SAMPLE NO.:	W-9968	SAMPLE DISCARD DATE:	07/20/86

METALS FLAME ANALYSIS
Dissolved

PARAMETER	DETECTION LIMIT	RESULT	UNITS
Cadmium		2.48	mg/l
Copper		0.13	mg/l
Manganese		119	mg/l
Zinc		980	mg/l

METALS FLAMELESS ANALYSIS
Dissolved

PARAMETER	DETECTION LIMIT	RESULT	UNITS
Lead		0.16	mg/l

N.D.-Not Detected

Respectfully submitted,

WRIGHT LAB SERVICES, INC.

Ian M. Milnes
Laboratory Manager

IMM:kaa

• WATER/WASTEWATER
• SOILS SOLIDS
• AIR GASES

Wright Lab Services, Inc.

• ATOMIC ABSORPTION
• GAS CHROMATOGRAPHY
• WET CHEMISTRY

June 23, 1986

Mr. Eric J. Slavin
R. E. Wright Associates, Inc.
3240 Schoolhouse Road
Middletown, PA 17057

LAB ANALYSIS REPORT

PROJ. NAME:	NJZ/Palmerton	DATE SAMPLED:	05/28/86
PROJ. ID. NO.:	8520-2	DATE RECEIVED:	05/30/86
SAMPLE CODE:	RCRA-4	DATE COMPLETED:	06/20/86
SAMPLE DESC.:	Time: 15:10	SAMPLE COLLECTOR:	RB/JL/DS
LAB SAMPLE NO.:	W-9969	SAMPLE DISCARD DATE:	07/20/86

METALS FLAME ANALYSIS
Dissolved

PARAMETER	DETECTION LIMIT	RESULT	UNITS
Cadmium		2.46	mg/l
Copper		0.13	mg/l
Manganese		120	mg/l
Zinc		1000	mg/l

METALS FLAMELESS ANALYSIS
Dissolved

PARAMETER	DETECTION LIMIT	RESULT	UNITS
Lead		0.08	mg/l

N.D.-Not Detected

Respectfully submitted,

WRIGHT LAB SERVICES, INC.

Ian M. Milnes
Laboratory Manager

IMM:kaa